VOL. LXXII OCTOBER, 1927 NEW SERIES VOL. 25, NO. 1

JOURNAL
of the
American Veterinary Medical Association

FORMERLY

AMERICAN VETERINARY REVIEW

(Original Official Organ U. S. Vet. Med. Ass'n.)

EDITED AND PUBLISHED FOR

The American Veterinary Medical Association

CONTENTS

THE JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION is issued the first of each month. *Manuscripts and copy for insertion should be as nearly perfect as possible for the printer and should be received by the tenth of the preceding month to insure insertion in the next month's issue.* Volumes begin in April and October.

Communications relating to publication, subscriptions, advertisements and remittances for the JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION, as well as matters pertaining to the American Veterinary Medical Association and membership, should be sent to Dr. H. Preston Hoskins, Secretary-Editor, 716 Book Bldg., Detroit, Mich.

$4.00 per annum Foreign $5.00; Canada $4.25 Single Copies 40 cts. in U. S.

Entered as Second-Class Matter, March 15, 1923, at the Post Office at Detroit, Mich., under Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in Section 1103, Act of October 3, 1917; authorized October 28, 1918.

JOURNAL

OF THE

American Veterinary Medical Association

FORMERLY AMERICAN VETERINARY REVIEW

(Original Official Organ U. S. Vet. Med. Ass'n.)

H. Preston Hoskins, Secretary-Editor, 716 Book Building, Detroit, Mich.

Vol. LXXII, N. S. Vol. 25 **October, 1927** **No. 1**

PHILADELPHIA MEETING SETS STANDARD

Meetings of the American Veterinary Medical Association that are held during the next few years will be measured by the standard set by the Philadelphia meeting, held September 13-14-15-16, 1927. The attendance was approximately 800 and everybody seemed more than satisfied with the program and the appointments and facilities in connection with the meeting. The general sessions were convened, the scheduled business transacted and adjournments taken with clock-like precision. The reports of all officers and committees were ready for presentation when called for. Not a single report had to be called for the second time.

The address of President Sigler, published in this issue of the JOURNAL, was well received and indicated his close contact with all branches of the profession. The report of the Secretary showed that the Association had gained in membership during the past year. The financial statement of Treasurer Jacob showed that, in spite of unusually heavy expenses the past year, the balances in the various funds of the Association were on the right side of the ledger. Many were impressed with the report of the Committee on Legislation, especially that part showing what this committee had been able to secure in the way of increased alcohol allowances for veterinarians.

The two addresses by Professor Bang, one on tuberculosis and the other on infectious abortion, were outstanding contributions to the program. The same may be said of the four papers presented at the general session, Thursday evening. These will all be published in the JOURNAL, just as soon as possible, so that our members may have the pleasure of reading them in full. The motion-picture film on "Salmon Poisoning in the Dog," presented by Dr. B. T. Simms, of Corvallis, Oregon, was a distinct innovation in the way of contributions to our programs. The paper by Dr. E. C. Rosenow, of the Mayo Foundation, on "The Bacteriology of Periodic Ophthalmia in Horses" was a most masterly presentation of the results of a very highly scientific investigation. One round of applause after another greeted Dr. Raymond A. Pearson, as he delivered his address, entitled, "The Veterinary Profession: Its Recognition and Personnel." It could very appropriately be called "An Appreciation of Veterinary Service." The address of Dr. J. R. Mohler, chief of the Bureau of Animal Industry, threw new light on the importance of our poultry industry and the necessity for the proper veterinary supervision of the control of poultry diseases.

The banquet, Wednesday evening, was a very enjoyable occasion. It was really one of the outstanding events of the week. Beautiful women, well-groomed men, artistically decorated tables, delicious food, a splendid orchestra, some rather unusual vaudeville entertainment, and four very inspiring addresses, seasoned with spice added by the dean of toastmasters, Dr. P. A. Fish, comprised the evening's program. Richly deserved praise was showered on Dr. T. E. Munce, chairman of the Banquet Committee, and his associates.

Considerably over 300 members attended the Wednesday afternoon session for the election of officers and the selection of the 1928 meeting-place. Dr. Reuben Hilty, practitioner, of Toledo, Ohio, was elected president. Dr. Robert S. MacKellar, practitioner, of New York City, was elected member-at-large of the Executive Board, succeeding Dr. Cassius Way, of New York City, who has served the Association so efficiently in the same capacity for the past six years. Dr. B. T. Simms, of Corvallis, Oregon, was elected first vice-president. Colonel W. Geo. Turner, Director of the Veterinary Corps, U. S. Army, was elected second vice-president. Dr. R. P. Marsteller, of College Station, Texas, was chosen third vice-president. Dr. A. A. Etienne, of Montreal, Quebec, and Dr. J. V. Lacroix, of Evanston,

Illinois, both practitioners, were selected to serve as fourth and fifth vice-presidents, respectively. Dr. M. Jacob, of Knoxville, Tennessee, was elected treasurer of the Association for the tenth term, without opposition.

Minneapolis was selected for the 1928 meeting, much to the satisfaction of the veterinarians from the Central West. Just prior to the session at which this selection was made, rumors were flying thick and fast that some other city would be selected for the 1928 meeting. If there was any real opposition to Minneappolis being chosen for the 1928 meeting, it melted away like snow before a noonday sun just as soon as Dr. Charles E. Cotton took the floor in behalf of Minneapolis. A number of other cities, including Indianapolis, Detroit, Chattanooga, Buffalo, Peoria, and others too numerous to mention, were apparently content to extend their invitations for some date later than 1928.

The sessions of the various sections were very well attended, particularly the two practice sections. Upwards of forty papers were presented in the four sections. All of these, of course, will be published in the JOURNAL, in the near future. Elections of section officers resulted as follows.

General Practice

Chairman—Dr. J. N. Frost, Ithaca, N. Y.
Secretary—Dr. E. P. Althouse, Sunbury, Pa.

Sanitary Science and Food Hygiene

Chairman—Dr. R. V. Rafnel, Jackson, Miss.
Secretary—Dr. Wm. H. Lytle, Salem, Ore.

Education and Research

Chairman—Dr. R. A. Runnels, Blacksburg, Va.
Secretary—Dr. M. J. Harkins, Philadelphia, Pa.

Small Animal Practice

Chairman—Dr. J. V. Lacroix, Evanston, Ill.
Secretary—Dr. H. J. Milks, Ithaca, N. Y.

The clinic at the University of Pennsylvania Veterinary School lasted practically all day Friday. It was divided into four sections, two being in progress during the morning and two during the afternoon. The facilities and arrangements for holding the clinic were unusually good and favorable comments were heard on all sides from those whose privilege it was to witness the various operations and demonstrations. The Local Committee

on Arrangements served a very nice luncheon at noon. This made it possible for everybody to stay right on the grounds. A group picture was taken during the luncheon recess.

The certificate plan went over and made it possible for a large number of those in attendance to return home at reduced rates. The weather was very pleasant during the week, with the exception of Thursday, when it was quite warm. A great deal of the success of the meeting was due to the fact that the arrangements at the Bellevue-Stratford Hotel were such as to make it possible for all meetings to be held on the same floor. The registration desk, the Secretary's office, the exhibits and all of the meeting-rooms were on one floor, so that no time was lost in going from one meeting to another.

The ladies in attendance had a particularly busy week, under the direction of Mrs. H. B. Cox. Some form of entertainment had been arranged for every day. On Thursday they were all taken to Atlantic City and the attractions of this resort were so strong that quite a number of the gentlemen were seen accompanying the ladies on the trip. The meeting of the Women's Auxiliary to the A. V. M. A. was reported as having been a most successful one.

No small amount of credit should be given to President Sigler for the manner in which he conducted the general sessions. There was not a single hitch during the entire program. Harmony seemed to be the watchword. Dr. C. J. Marshall, as chairman of the Local Committee on Arrangements, and Dean L. A. Klein, in charge of matters pertaining to hotels, halls and headquarters, had anticipated every need of the convention, all of which contributed to the success of the meeting and materially lightened the labors of the officers of the Association.

One of the very pleasant events of the week was the marking of the eightieth birthday of Dr. George H. Berns, of Brooklyn. At the afternoon session, on Thursday, Dr. Berns' admirers presented him with a beautiful cane, in recognition of the distinguished services rendered the profession by Dr. Berns. The presentation was made by Dean Veranus A. Moore, who recited the sterling qualities of Dr. Berns, one of the most eminent veterinary practitioners of America.

Some splendid publicity for the veterinary profession was one of the by-products of the meeting. The address of President Sigler has been referred to by the press all over the country. The suggestion to coin a new word to replace veterinarian was taken

up vigorously by the reporters and press associations, and regardless of the outcome, this publicity will have considerable value in directing attention to the wide scope of veterinary activities, appreciated by so few. To Dr. G. A. Dick should go much credit for his efforts as chairman of the Subcommittee on Publicity. More later.

REUBEN HILTY, D. V. M.

We know of no better reward for having lived a clean, upright and useful life than for one to realize, on his fiftieth birthday, that, by popular vote of his professional colleagues on the North American Continent, he has been chosen president of the American Veterinary Medical Association. More than forty-nine years ago Reuben Hilty was born on a farm in northwestern Ohio, near Bluffton.

Reuben Hilty was born of substantial parentage, pioneers in Ohio, whose teachings were of the character-forming and high-ideal type. As was the custom in those days, the Hilty family was a large one. Today each of that large family of children has vindicated the tutelage of the parents and has exemplified the ideals instilled into the children.

After a common school education, Reuben Hilty entered the Ohio Northern University, at Ada, then known as Ohio Normal University. In 1904 he was married and at that time was engaged in farming and operating a tile and brick plant. In that same year he enrolled in the College of Veterinary Medicine, Ohio State University, and was graduated in June, 1907.

Following graduation he located in general practice at Bluffton, Ohio, where he continued successfully until 1909, when the late Dr. John V. Newton went to Bluffton and induced Dr. Hilty to come to Toledo, as his associate. The partnership of Newton and Hilty, at 619 Walnut Street, Toledo, continued until January 1, 1925, when, with fast failing health, Dr. Newton desired to become inactive. On that date Dr. Hilty located alone at 624 Huron Street, with a large and modern small-animal hospital and offices. Dr. Newton died just six months later.

Since the day of his graduation Reuben Hilty has been active and interested in association and organization work. He joined the Ohio State and American Veterinary Medical associations in 1908. He served the former as its secretary, 1912-1915, and then as president, 1915-1916. For six years (1915-1921) he was a member of the Ohio State Board of Veterinary Examiners. Dr.

Hilty is about as well known to the profession in Michigan as he is in Ohio. Being a member of the Michigan State Veterinary Medical Association, he seldom misses a meeting or a conference at Lansing.

Dr. Hilty possesses a very enviable war record. He was commissioned a Major in the Veterinary Corps early in the war (1917), served first with the 77th Division, at Camp Upton, organized Veterinary Hospital No. 2, took the organization to France in March, 1918, and erected a veterinary hospital at Treveray, just back of the lines, and was appointed Chief Veterinarian of the advance section in July, 1918, which capacity placed Major Hilty upon the staff of General Sample and which capacity he held until May, 1919, when the outfit started home. Dr. Hilty was discharged as Lieutenant-Colonel Hilty, having been promoted to this rank early in 1919.

Dr. and Mrs. Hilty have two sons; John, aged 21, who is a student in Toledo University, and Robert, aged 19, a sophomore in the University of Wisconsin.

During his eighteen years' residence in Toledo, Dr. Hilty has established a very enviable status in that city. He is active in the Kiwanis Club, having been a director last year; for many years he has been a trustee in the First Westminster Presbyterian Church, and is high in Masonic circles, having been a member of the Shrine for ten years.

When we realize that Reuben Hilty has had no business or political connection of a remunerative character since graduation in 1907, and has advanced himself and his family by means of the general practice of his profession, the membership of the American Veterinary Medical Association should endorse heartily the action of those present at the Philadelphia meeting in electing Reuben Hilty, a one hundred per cent practitioner, to the presidency. His personal appearance, his speaking voice, and his judgment all measure up to the above biography, which is written from a knowledge of the man based upon years of intimate association and friendship.

F. A. L.

Automobiles have finally crowded out the last horse from the French presidential stables, at the Elysee Palace, in Paris. Andre Decaux, the master of the horse, who has served eight presidents during his thirty-three years there, has been pensioned and is working in a bank.

APPLICATIONS FOR MEMBERSHIP

Another flood of applications for membership—fifty-three to be exact—bringing the total for the year almost to the 300 mark. Among the applicants seeking admission to the A. V. M. A. this month are veterinarians located in twenty-one states, from Maine to California, the District of Columbia and Canada. These applicants include alumni of thirteen veterinary colleges in the United States, one in Canada and three in Europe. The classes represented date from 1875 to 1927.

In his presidential address, Dr. Sigler asked every member to enroll a worthy brother under the A. V. M. A. banner. This is how it may be done.

> Applications for membership shall be made upon blanks furnished by the Association, in the handwriting of the applicant, and must be endorsed by two members of the Association in good standing, one of whom must be a resident of the state, province or territory in which the applicant resides. Applications must be accompanied by the membership fee of $5.00 and dues pro rata for the balance of the fiscal year current, as stated on the application blank. Applications must be filed with the secretary and be examined by him for correctness and completeness as far as available information will allow. After such approval by the secretary, the latter will cause to be published in the official JOURNAL, as soon thereafter as possible, said application with name and address of applicant, college and year of graduation, and names of vouchers. If no objections shall be filed with the secretary, as against the applicant being admitted to membership in the Association, his name shall again be listed in the next issue of the JOURNAL, and if no objections shall have been filed within thirty days after the second publication of the name of the applicant, he shall automatically become a member and shall be enrolled by the secretary, and membership card issued. If any objections be filed against any applicant, either on first or second notice, said application will be referred to the Executive Board for consideration.

The amount that shall accompany an application filed this month is $6.25, which covers membership fee and dues to January 1, 1928, including subscription to the JOURNAL.

FIRST LISTING

ALLIS, NED H. Wyalusing, Pa.
V. S., Ontario Veterinary College, 1888
Vouchers: C. J. Marshall and G. A. Dick.

BALENTINE, ROSWELL P. Mifflintown, Pa.
V. M. D., University of Pennsylvania, 1919
Vouchers: E. T. Booth and E. P. Althouse.

BEIERSDORF, OTTO WILLIAM 44 Bancroft Ave., Milford, Mass.
D. V. M., Chicago Veterinary College, 1915
Vouchers: H. W. Jakeman and J. D. Pierce.

BLICKENSTAFF, PERRY H. 344 Seventh St., Chino, Calif.
D. V. M., State College of Washington, 1923
Vouchers: John L. Tyler and W. L. Curtis.

BOWEN, LEROY E. 1111 Commerce St., Lynchburg, Va.
V. S., B. V. Sc., Ontario Veterinary College, 1911
Vouchers: W. B. Holmes and John S. Nicholas.

BOYCE, MCKEEN State St., Vanport, Pa.
V. M. D., Indiana Veterinary College, 1910
Vouchers: T. E. Munce and F. E. Jones.

BRADLEY, FREDERICK HENRY 314 Court St., Plymouth, Mass.
V. M. D., University of Pennsylvania, 1902
Vouchers: S. T. Howland and H. W. Jakeman.

BRENNING, IRVIN F. 455 Ellicott St., Buffalo, N. Y.
D. V. M., Cornell University, 1923
Vouchers: Frank E. McClelland and C. E. Hayden.

BRIGGS, FREDERICK L. 118 Oak Hill Ave., Attleboro, Mass.
D. V. M., U. S. College of Veterinary Surgeons, 1921
Vouchers: H. W. Jakeman and J. D. Pierce.

CANAKIS, PETER H. Pierre, S. D.
D. V. M., Chicago Veterinary College, 1916
Vouchers: C. C. Lipp and J. B. Taylor.

CLARK, CLARENCE W. 68 Liberty Ave., W. Somerville, Mass.
V. S., Ontario Veterinary College, 1897
Vouchers: H. K. Copithorn and R. W. Smith.

CORENZWIT, HARRY MORRIS Rising Sun, Md.
V. M. D., University of Pennsylvania, 1927
Vouchers: G. A. Dick and C. J. Marshall.

DAIR, MARTIN JOSEPH Manhasset, N. Y.
D. V. S., American Veterinary College, 1895
Vouchers: J. Elliott Crawford and Robt. S. MacKellar.

DERRICK, GEORGE WEBSTER 107 N. Quarry St., Ithaca, N. Y.
D. V. M., Cornell University, 1917
Vouchers: C. E. Hayden and P. A. Fish.

DEVARENNES, EDWARD ARTHUR 31 Bridge St., Quincy, Mass.
V. S., Ontario Veterinary College, 1913
Vouchers: H. W. Jakeman and R. S. Youmans

EAMES, HAROLD NELSON 109 Wentworth Ave., Lowell, Mass.
V. M. D., University of Pennsylvania, 1912
Vouchers: H. W. Jakeman and G. L. Cheney.

FISHER, ROY T. Box 436, Sand Springs, Okla.
D. V. S., Kansas City Veterinary College, 1910
Vouchers: C. Pedrick and C. R. Walter.

GALLOWAY, JAMES MCINNES 10 S. Belvidere St., Richmond, Va.
M. R. C. V. S., Royal Veterinary College, Glasgow, 1913
Vouchers: H. C. Givens and Peter F. Galloway.

GARDINER, WALTER WILLIS Moorestown, N. J.
V. M. D., University of Pennsylvania, 1896
M. D., Medico-Chirurgical College, 1897
Vouchers: Wm. J. Deegan and E. T. Booth.

GOODING, JOHN HENRY Box 875, Dixon, Calif.
D. V. M., State College of Washington, 1921
Vouchers: L. F. Conti and Kenneth G. McKay.

HALES, MARVIN R. c/o Dept. of Agr., Olympia, Wash.
D. V. M., State College of Washington, 1926
Vouchers: E. A. Grubb and H. Preston Hoskins.

HOOKER, WILLIAM ANSON c/o Dept. of Agr., Washington, D. C.
D. V. M., George Washington University, 1913
Vouchers: John R. Mohler and John S. Buckley.

INGRAM, FRANK A. 690 Asylum St., Hartford, Conn.
V. S., Ontario Veterinary College, 1892
Vouchers: Geo. E. Corwin and C. J. Marshall.

JONES, JAMES B. 932 Venice Blvd., Los Angeles, Calif.
B. S., D. V. M., State College of Washington, 1926
Vouchers: John F. McKenna and W. L. Curtis.

JUHL, PETER CHRISTOPHER 7000 Amboy Rd., Prince Bay P. O., S. I., N. Y.
V. S., Royal College of Veterinary Surgeons, Denmark, 1875
Vouchers: H. Jensen and J. Elliott Crawford.

KAVANEK, JOHN JOSEPH 249 Cornwall St., Hartford, Conn.
D. V. M., Terre Haute Veterinary College, 1915
Vouchers: Edwin Laitinen and A. T. Gilyard.

KEYES, KENNETH WILBER 286 Pleasant St., Concord, N. H.
D. V. M., Cornell University, 1917
Vouchers: Fay F. Russell and J. N. Frost.

KIMPLE, FLOYD L. 15 Eighth St., Redlands, Calif.
D. V. M., Chicago Veterinary College, 1916
Vouchers: John L. Tyler and F. P. Wilcox.

LOCKE, HARRY A. 1422 Irving St. N. W., Washington, D. C.
D. V. M., George Washington University, 1912
Vouchers: John R. Mohler and W. E. Cotton.

MCLEISH, JAMES ARCHIBALD 551 Earnscliff Ave., Montreal, Que.
V. S., Ontario Veterinary College, 1902
Vouchers: Orlan Hall and William Moynihan.

MADDOCKS, MYRON EDWIN 7 School St., Augusta, Me.
V. M. D., University of Pennsylvania, 1910
Vouchers: G. R. Caldwell and John H. Winstanley.

MAGILL, CHARLES E. Haddonfield, N. J.
V. M. D., University of Pennsylvania, 1893
Vouchers: J. H. McNeil and H. B. Cox.

MARTIN, W. WALTER 8 St. Clair Ave., Spring Lake, N. J.
V. M. D., University of Pennsylvania, 1895
Vouchers: J. H. McNeil and C. J. Marshall.

MAXWELL, O. C. Monon, Ind.
D. V. M., Indiana Veterinary College, 1911
Vouchers: Edgar D. Wright and John H. A. Anderson.

NAYLOR, TEMPLE H. 202 S. 2nd Ave., Pocatello, Idaho.
D. V. M., State College of Washington, 1926
Vouchers: W. A. Sullivan and F. H. Melvin.

NELSON, SWEN E. Preston, Idaho.
D. V. S., Kansas City Veterinary College, 1911
Vouchers: W. A. Sullivan and W. E. Neary.

PARKER, WALTER G. Clark's Summit, Pa.
V. M. D., University of Pennsylvania, 1910
Vouchers: A. E. Hollister and F. H. Chandler.

POMEROY, THOMAS P. Boyne City, Mich.
D. V. S., Grand Rapids Veterinary College, 1900
Vouchers: C. H. Clark and B. J. Killham.

POTTEIGER, ALBERT R. Selinsgrove, Pa.
V. S., Ontario Veterinary College, 1891
Vouchers: E. P. Althouse and H. R. Church.

REGAN, JOHN JOSEPH
c/o Dairymen's League, 120 W. 42nd St., New York, N. Y.
D. V. M., Cornell University, 1915
Vouchers: E. T. Booth and C. L. Kern.

RINK, JOHN Factoryville, Pa.
V. S., Ontario Veterinary College, 1914
Vouchers: Thos. D. James and G. A. Dick.

ROBINSON, OSEY EDWARD Bixby, Okla.
D. V. M., Indiana Veterinary College, 1913
Vouchers: C. Pedrick and C. R. Walter.

SALLADE, J. GILL 49 Majestic Ave., Asheville, N. C.
V. S., Ontario Veterinary College, 1894
Vouchers: Wm. Moore and L. J. Faulhaber.

SANDERS, PHILLIP Brown Valley, Minn.
D. V. M., Kansas City Veterinary College, 1912
Vouchers: H. C. H. Kernkamp and W. L. Boyd.

SMITH, CLARENCE D. 358 S. Mill St., Massillon, Ohio.
V. S., Ontario Veterinary College, 1906
Vouchers: H. E. Ash and C. B. Frederick.

STANLEY, WILLIAM MORRIS 708 S. Samuel St., Charles Town, W. Va.
V. S., Ontario Veterinary College, 1895
Vouchers: S. E. Hershey and Harry B. Langdon.

STEIN, FRANK LOUIS 297 Central Ave., Rochester, N. Y.
D. V. M., Chicago Veterinary College, 1912
Vouchers: Frank E. McClelland and L. Enos Day.

STONE, EDWARD STANLEY Waverly, Pa.
D. V. M., Cornell University, 1918
Vouchers: Thos. D. James and H. R. Church.

SWINK, CLARENCE EDWIN Dunnell, Minn.
D. V. M., Iowa State College, 1927
Vouchers: C. H. Stange and W. F. Guard.

TERRY, HARRY CLIFTON 113 W. Maple Ave., Langhorne, Pa.
D. V. S., American Veterinary College, 1894
Vouchers: Henry W. Turner and T. E. Munce.

TILTON, CHARLES HENRY 45 Newton Place, Framingham, Mass.
D. V. S., American Veterinary College, 1896
Vouchers: Thos. A. Doyle and H. W. Jakeman.

TUFTS, SAMUEL ROBERT 142 Mt. Kenble Ave., Morristown, N. J.
M. R. C. V. S., Royal (Dick) Veterinary College, Edinburgh, 1893
Vouchers: J. H. McNeil and Robt. S. Mosedale.

TURNER, S. MONTE State House, Boise, Idaho.
D. V. M., Ohio State University, 1912
Vouchers: W. A. Sullivan and W. E. Neary.

SECOND LISTING

Bardwell, Robert H., 109 Delaware Ave., Ithaca, N. Y.
Brown, Ellsworth Sheffer, 26 Chapin St., Canandaigua, N. Y.
Cook, Bertram L., Farmington, Minn.
Corwin, Willis Theodore, Pine Island, Minn.
Dornbusch, Edward A., Milbank, S. D.
Exley, Slade Heyward, 320 Agricultural Bldg., Raleigh, N. C.
Fladness, Severin O., B. A. I., Washington, D. C.
Fretz, Warren J., 1020 Commerce Bldg., St. Paul, Minn.
Graham, O. H., Yarboro, N. C.
Guile, Charles Russell, 25 Court St., Canton, N. Y.
Hancock, Dolie C., Mays, Ind.
Hodgson, Ernest Eugene, Fort Bliss, Texas.
Jacobson, Fred O., Richland Center, Wis.
Johnson, Cecil Haley, 320 Agricultural Bldg., Raleigh, N. C.
Kinneberg, Otto, 1985 Grand Ave., St. Paul, Minn.
Kohler, Daniel Dietrich, Boyertown, Pa.
Krosch, Clair Elmer, Box 63, Blue Earth, Minn.
Lagarde, Rafael, Calle "B" No. 238 Vedado, Havana, Cuba.
Lechner, Ernest G., Red Hill, Pa.
Lefler, H. P., Fort Dodge Serum Co., Fort Dodge, Iowa.
McKee, J. G., Marshall, N. C.
Melody, George E., Hoven, S. D.
Miller, Frederick B., 33 Grow Ave., Montrose, Pa.
Pratt, Lisle Atwood, 31 E. Main St., Pottstown, Pa.
Proper, L. J., 1795 Moore St., San Diego, Calif.
Rea, H. Calvin, Route 8, Charlotte, N. C.
Rodger, David Brown, 4065 Dorchester St. W., Montreal, Que.
Schmidt, Arnold H., Triumph, Minn.
Swanger, George W., 101 E. Chestnut St., Lebanon, Pa.
Thomas, Ezekiel Fred, University of Florida, Gainesville, Fla.
Tompkins, Charles L., Ivanhoe, Minn.
Turner, Charles A., Westminster, Md.

Voetberg, D. N., 407 Sixth St., Grundy Center, Iowa.
Ward, F. G., 560 7th St., San Diego, Calif.
Weishaar, Frank, 323 Senator St., Brooklyn, N. Y.
Zepp, Clarence P., 128 W. 53rd St., New York, N. Y.

REINSTATED

Curry, Joseph M., 39 Hartland St., Hartford, Conn.
DeGroodt, A. J., Mendham, N. J.
Hoff, R. S., Newton, N. J.
Lebeson, Harry, 15426 Turner Ave., Detroit, Mich.
Neuhaus, Chas. O., 39th St. & Woodland Ave., Philadelphia, Pa.

COMING VETERINARY MEETINGS

New York City, Veterinary Medical Association of. Academy of Medicine, 5th Ave. & 103rd St., New York, N. Y. Oct. 5, 1927. Dr. C. P. Zepp, Secretary, 128 W. 53rd St., New York, N. Y.

Eastern Iowa Veterinary Association. Hotel Montrose, Cedar Rapids, Iowa. Oct. 5-6, 1927. Dr. J. B. Bryant, Secretary, Mt. Vernon, Iowa.

Chicago Veterinary Society. Great Northern Hotel, Chicago, Ill. Oct. 11, 1927. Dr. J. B. Jaffray, Secretary, 2956 Washington Blvd., Chicago, Ill.

Maine Veterinary Medical Association. Lewiston, Me. Oct. 12, 1927. Dr. C. F. French, Secretary, Rockland, Me.

Southeastern Michigan Veterinary Medical Association. Detroit Mich. Oct. 12, 1927. Dr. H. Preston Hoskins, Secretary, 716 Book Bldg., Detroit, Mich.

Kansas City Association of Veterinarians. New Baltomore Hotel, Kansas City, Mo. Oct. 18, 1927. Dr. J. D. Ray, Secretary, 400 New Centre Bldg., Kansas City, Mo.

Keystone Veterinary Medical Association. Philadelphia, Pa. Oct. 26, 1927. Dr. C. S. Rockwell, Secretary, 5128 Chestnut St., Philadelphia, Pa.

Connecticut Veterinary Medical Association. Hotel Garde, New Haven, Conn. Nov. 2, 1927. Dr. Geo. E. Corwin, Secretary, 11 Warrenton Ave., Hartford, Conn.

Florida State Veterinary Medical Association. Jacksonville, Fla. Nov. 14-15, 1927. Dr. A. L. Shealy, Secretary, University of Florida, Gainesville, Fla.

Georgia State Veterinary Association. Jacksonville, Fla. Nov. 14-15, 1927. Dr. Peter F. Bahnsen, Secretary, Ansley Hotel, Atlanta, Ga.

Southeastern States Veterinary Medical Association. Jacksonville, Fla. Nov. 14-15, 1927. Dr. J. I. Handley, Secretary, Box 1533, Atlanta, Ga.

THE ADDRESS OF THE PRESIDENT

By T. A. SIGLER, *Greencastle, Ind.*

We are meeting in the City of Brotherly Love and I hope all of our deliberations throughout the convention here will represent that motto. When the American Veterinary Medical Association met in this city in 1918, we were in that great turmoil of war, and now peace and plenty abides over our land. Great depression follows all wars. We have passed that low point of depression in our live stock and agriculture. We can look to a brighter future. There is not a single cloud on the horizon of the future of our live stock industry and our country will be measured by our live stock industry. We are a large and growing nation and our people must be fed. They are dependent on food-producing animals and must look to the veterinarians for their protection and for safeguarding their welfare.

THE BACKBONE OF THE NATION

Agriculture and animal industry form the backbone of the nation, and the veterinary profession has made this possible by its protection and support of animal industry through controlling contagious diseases in our herds and flocks. We are guardians of public health as well as public wealth, and this applies to all members of the veterinary profession, whether they represent practitioners, federal and state sanitarians, Army and research workers, or the commercial veterinarians who deserve great credit for developing agencies for the diagnosis and control of diseases. Our instruments are more scientifically constructed to meet the demands of modern science. All have an important function to perform. All deserve credit for the advancement of the cause. We are all more or less dependent on one another. Nor should we make unreasonable demands upon one another.

The veterinary profession is made up of many groups: the largest represented by the practitioner and the next largest by the Bureau of Animal Industry, university and college veterinarians, state sanitary forces and those representing individual concerns, such as the Western Weighing and Inspection Bureau, and railroad veterinarians. Many are employed by commercial houses and serum companies. The practitioners and the Bureau

*Delivered at the sixty-fourth annual meeting of the American Veterinary Medical Association, Philadelphia, Pa., September 13-16, 1927.

of Animal Industry veterinarians represent ninety per cent of the membership of the profession in this Association. The Association should be extending every effort to promote the interest and welfare of these groups. Tragedy stalks in the wake of both groups. Old practitioners face the evening of life without an income and many are forced to take up new and strange occupations, due to unjust competition teaching the laity to dispense with scientific services at a time when the world is crying out for us to give them a cure for this and for that, and to help them to control contagious diseases.

Bureau of Animal Industry veterinarians are overworked, underpaid and ambition-killed. These forces, who are the watchdogs of disease, are subject to call or transfer, at a moment's notice, to any part of the country, after homes are established, to leave family and friends, sometimes for many months. They are too poorly paid for the services they render and for the responsibilities they carry. These two groups have made it possible for the Corn Belt farmer to invest his dollar in mixed live stock, which is the very foundation and very life of agriculture. They have made it possible for the southern planter to diversify and raise cattle and other stock, instead of being a one-crop farmer. This was brought forcibly to our minds when the one-crop cotton planter faced the boll weevil. In other words they have made it possible for the southern farmer to invest the southern dollar safely in live stock and have made the entire North American Continent the safest place in the world to produce live stock.

Hog Cholera Remains Uncontrolled

The veterinary profession has controlled or eradicated every disease the live stock industry has called on it to combat, with the single exception of hog cholera, and this is the only serious disease that the laity has interfered with. And this stands out more prominently than an enumeration of all other achievements. Do away with the services of these men and we would be a devastated country, grass would grow in the streets of our cities. A sample of this was enacted in Russia a few years ago. The writer read, not from a medical or veterinary journal, but from the Associated Press, where 117 children were shot for sanitary reasons, for eating glandered horse meat. This condition was brought about by the Red Government overthrowing the sanitary laws. All of these facts show the need for veterinarians and the protection of our great animal industry against disease.

The veterinary practitioner, led by the Bureau of Animal Industry, has controlled and totally eradicated foot-and-mouth disease and contagious pleuro-pneumonia, glanders is but a passing dream, sheep scab is being controlled and hog cholera will be controlled when veterinarians are given command of this disease. The eradication of bovine tuberculosis is making progress. The area plan of testing cattle is meeting with favor and herd-owners want accredited animals. Larger appropriations and more men in the service will hasten the work; the lack of funds or small appropriations will retard the work. Early eradication is of sufficient importance that all forces do have a part in the work. Delays occasioned by the lack of funds and official veterinarians prevent progress, after a certain amount of testing has been done, and discourage owners in the possibility of ever freeing large areas of infection. Federal, state and county veterinarians do original testing. Retests and additions to herds should be made by the local practitioners, with indemnity paid on reactors disclosed by their tests.

Work for the Practitioner

There always will be work for the practitioner, after all contagious diseases are controlled, in the treatment of the individual animal. The future veterinarian must be more than the doctor of diseases. With his knowledge of animals and breeds, he should be able to advise his clients on the different breeds and types of animals, how to overcome hereditary weaknesses, sometimes brought about by breeders' fads and fancies, and to help produce greater vitality and secure more productiveness. His knowledge must not stop here. The nutritional diseases brought on by improper feeding and diet must be eliminated by proper nutrition.

It appears that within twenty-five years, two of man's greatest scourges, tuberculosis and cancer, will be done away with. This will increase the average span of life. Infant mortality in the human family has been greatly reduced in the last twenty-five years. Most of these are preventable. There is no reason why we cannot prevent the losses in our young stock and do away with rickets and parasitic diseases that are reducing our production and the vitality of our infant animal life.

The American Veterinary Medical Association should stress every effort to better the conditions of veterinarians employed in the Bureau of Animal Industry, also to improve conditions con-

fronting members of our profession in general practice. Since state men are largely controlled by political influence, they change from time to time, and after a few years in state work sometimes drop out of the profession entirely. These two great forces must go on forever, unhampered by political influence, and function unrestrained, if the profession is to succeed and if we are to have profitable live stock production in North America.

One year ago, the Executive Committee presented a proposal and made a promise that a special committee would be provided to visit the presidents and officers of land-grant colleges, to point out to them "that agriculture cannot succeed without a prosperous live stock industry, that live stock industry cannot prosper when hampered and menaced by animal diseases and plagues, that these diseases are prevented and controlled or eradicated by having competent veterinary service." Under the impression that this resolution had passed, the Chair appointed such a committee. Why, after such a committee was appointed, the whole plan was dropped, I do not know. I can see no harm coming from such a procedure. That men of education, experience and ability and the leading men of our profession, cannot go before men of intelligence and point out to them the need of a greater profession and a better protection to the young man of ability that has to meet the requirements and standards as prescribed by the Bureau of Animal Industry and the American Veterinary Medical Association who casts his lot and invests his time and money should have the protection and support of this Association.

Cooperation Desirable

Already one agricultural college has ceased to teach veterinary science except to enrolled students. If the American Veterinary Medical Association will use its influence to make the veterinary profession a desirable field, there will be no difficulty in filling our depleted ranks. On the other hand, when our live stock takes a boom, such as there is every reason to believe that it will, it will be necessary to shut out the undesirables. I have no quarrel with this body at this time, but do not understand why we can not come to some agreement with the heads of these institutions and talk upon what is best for all concerned, who can best work and best agree.

The veterinary profession is not on trial in North America. It has been weighed in the balance and found not wanting. We

are passing through a period of unrest in all lines. Farming has been a hard game to play. Some have tried to dispense with veterinary service. Probably time alone can rectify this. When farming conditions become better, our services will be more in demand. We have this consolation, that "knowledge is power," and must be recognized as such and in the time of need agriculture must depend upon the trained veterinarian to control disease. Already our agricultural press has sensed this situation. Editorials have appeared from time to time encouraging young men to take up the veterinary profession. Dr. J. R. Mohler, chief of the Bureau of Animal Industry, has pointed out the need of young men entering veterinary colleges to keep up the ranks of the Bureau of Animal Industry, the greatest live stock sanitary force in the world. The heads of the different departments of our animal industry have attracted the attention of the entire world in their scientific investigation in the study of parasitic disease, their life cycles and control. Dr. M. C. Hall and others of his force have done more to endear the veterinary work and achievements to the general public than any other branch of work up to the present time, and should be commended by our Association for their untiring efforts.

More Boosters Needed

One of the leading veterinarians of the American Veterinary Medical Association has advocated a field man or an assistant to the Secretary-Editor, whose time is pretty well taken up, to go out and sell the veterinary service. A man in this capacity, of the right type, who understands both sides of the question and the problems confronting the stockman and veterinarian, could render signal service. A closer relationship between breeder and practitioner is needed. The average veterinarian should avail himself of the opportunity of being placed on the programs of breeders' meetings, or farm bureau associations. Here he has a splendid opportunity to elevate the standing of the profession in his community. Many veterinarians complain that the American Veterinary Medical Association is not doing more in their behalf. There are too many who are not boosting the cause in their own surroundings. What we need is more boosters—more members of that type. A man who could go out into the field and devote his time to this might be all right. This would draw heavily on our financial reserves for the time being, but would accomplish a lot of good in the end.

Our veterinary conference would probably help to take care of this situation by placing breeders on our programs. This would bring together harmonious cooperation and mutual understanding would be created by the bringing together of members of the profession and live stock industry, thus advancing the welfare of both classes. Veterinary conferences have done much to stimulate interest among the practitioners, bringing them first-hand information from the clinician and expert in their special line of animal pathology and investigation. Never has there been such an interest taken in the history of veterinary medicine as in the past year. State associations and short courses have been well attended by overflowing crowds, seeking knowledge of diseases of the food-producing animals and great interest is being taken in small-animal practice.

I hope to see the agricultural colleges continue their conferences and enlarge on their programs and clinics. Both conference and association meeting have their places. The former is educational and the latter takes care of organization and the social end of our work. I cannot help but feel that we need closer affiliation with state associations at this time, whereby a closer cooperation may be worked out with our resident state secretaries and the secretaries of state associations with the national association.

Twenty-four Meetings in January

There were no less than twenty-four meetings held in January. Many conferences and state meetings of the Corn Belt were held on the same dates. The secretaries of the state associations should get together, as some of the northwestern states did the past summer, and work out a program, whereby they can arrange dates so our specialists and clinicians can make out an itinerary for as many of these meetings as they care to attend. This will help the various associations to get talent for their meetings, without increased cost and the inconvenience of returning to their homes, and do away with a lot of unnecessary travel. Some have advocated a permanent meeting place, like the United States Live Stock Sanitary Association, located at Chicago, or as centrally located as possible, and taking the meeting out to some other place every four or five years. I believe the better plan is to bring the Association to the place where it attracts the most members and affects the largest body of veterinarians for the next few years. Every member should try to enroll a

worthy brother of our profession under the banner of the American Veterinary Medical Association. We now have about 3700 members and there should be at least as many more.

The past year has removed three great shining lights from our ranks, along with several other members. Dr. John W. Adams, our past president, the scholar, gentleman and educator; Dr. Otto Faust, our loyal and regular attendant, and Dr. H. S. Murphey, one of our greatest scientific investigators, and it is fitting that we should here refer to them and offer a tribute to their memory. Truly three great men have passed. Peace be to their ashes. I will not try to elaborate on this subject, since we have a Committee on Necrology, which will report later.

Selling the Profession

Our greatest problem is selling our profession to the public, who are misinformed concerning the duties of our calling. Living in a hotel of our town for the past twenty-five years and coming in contact with the traveling public, I refer to the people who do not own a cow, horse or dog or any other live stock. They very frequently ask this question: "What do you veterinarians do since the horse is gone?" My answer to this question is, "Where is he gone and when did he go?" We still have 17,000,000 horses and mules in the United States. People do not think of the large amount of wealth tied up in other classes of live stock. And there was never a greater demand for a good class of horses than now.

The public still wants to associate us with the horse doctor of the past. We will admit the decline but not the fall of the horse. The horse is staging a rapid come-back. He has met motor competition and has adjusted himself to it. Do not neglect your horse practice for we are still judged by our ability to treat this animal. The beef cattle trade has been affected more by the advent of the motor car than has the horse. Our small kitchenettes, the high price of gas and the length of time it takes to prepare a large roast influence our people. They want cat meat, canner meat, pork and barbecue sandwiches. Dairying is on a sound foundation. You can still sell your ice-cream cones along the gas-filling station route. We welcome the advent of the coming of the motor cars that divorced us from the livery stable horse doctor and caused us to cast our lot in other directions and developed other lines of practice that might still be begging for our services.

Who would go back to conditions of years ago with its slow mode of transportation? Modern invention has helped to develop veterinary education. The use of motion pictures in medical classes makes it possible for students to study more carefully the technic of surgical experts. Plans are being made for the showing of colored slow-motion pictures of surgical operations in medical colleges.

The man in practice should avail himself of the opportunity of helping the profession by reporting his cases of interest to the JOURNAL. In that way we can make our JOURNAL very interesting to the practitioner. It also helps the Editor, who will be glad to report your cases for you. Otherwise, we will have a JOURNAL filled with the proceedings and activities of the American Veterinary Medical Association only, which will become, at times, a little tiresome to some who are interested only in the practical side of our affairs. This would be a great help to the Secretary-Editor, who at all times has a hard job to perform.

In closing, some of my remarks may seem personal or harsh, but I do not wish to be mistaken and have only the welfare and future of the Association at heart. I want to see it grow, function and prosper for the best interests of all concerned, with charity in my heart for all, malice to none. Before closing I wish to compliment the work of the Women's Auxiliary in handling the Salmon Memorial Fund, by helping worthy students in time of need. Also I wish to thank the various committees for their hearty cooperation the past year. I am very grateful for the honor conferred upon me at the Lexington meeting, one year ago, which is conceded the highest gift of my colleagues, and I do not wish this to be my retirement but instead I want to step out into the ranks as a private, where I can continue to work for the good of the American Veterinary Medical Association. And I trust that the sixty-fourth annual convention of the American Veterinary Medical Association here in Philadelphia will be the most successful in her history and that all of her deliberations will represent that motto referred to in the opening remarks, brotherly love.

Minister: "And now, children, what does papa do first when all are seated at the table?"

Johnny: "He sez, 'Go slow on the butter, kids, it's fifty cents a pound."—*Pictorial Review.*

TUBERCULOSIS IN CATTLE*

By Prof. Dr. B. Bang, *Copenhagen, Denmark*

I think most of you know that I, many years ago, began combating tuberculosis in cattle in my country, Denmark. At the International Congress for Hygiene and Demography in Budapest, in 1894, I read a paper on my ideas. I showed that the immense majority of calves are born healthy, even if their parents are affected with tuberculosis (in not too high a degree) and that they will remain healthy when separated from the infected stable and protected against infection through the milk. And I maintained (against Nocard) that there was no necessity to demand that cows, which showed no other symptoms of tuberculosis than the reaction to the tuberculin test, should be slaughtered in the lapse of a year. The great majority of reacting cows were affected only in a very slight degree (*e. g.*, with small nodules in some lymphatic glands) and in a great many of them the disease would not progress (or only very slowly) and some would be cured. In my opinion such reacting but apparently healthy cows should be allowed to live, their calves should be raised, but be separated from the stable, and their milk should be used.

It was my first idea to raise a new healthy herd of the calves and to use tuberculin only in this herd in order to remove from it such animals that reacted at the test—but soon I conceived the natural thought, that it might be good to begin with testing the whole herd and dividing it into reacting and non-reacting parts, to the latter of which were joined the calves that should be reared (even they which were born of reacting but clinically healthy cows) because I expected that the building of a new healthy herd would be realized *sooner* in this way. The healthy herd should be tested with tuberculin every year (or twice a year) in order to be able to eliminate, as soon as possible, such animals, which, in spite of the separation, possibly might be infected. This method is commonly known as the Bang method. When the isolation has been kept very carefully, the result has been satisfactory in many herds; but the carrying out of the measures requested demands great vigilance and perseverance on the part of the farmers as well as on that of their servants, qualities not always met with.

*Presented at the sixty-fourth annual meeting of the American Veterinary Medical Association, Philadelphia, Pa., September 13-16, 1927.

I soon saw that it was much better—when I had to do with a herd in which the disease had long been prevalent—at first to test *only calves but none of the adult animals.* Most of these would react, if tested, and even of the non-reacting, which had been exposed to infection for a long time, not a few would later on turn out to be infected.

Already in 1899, in my report to the International Veterinary Congress in Baden-Baden, I recommended this method and on the basis of my long experience I still maintain that *the safest way of rooting out tuberculosis in a herd, that has long been infected, is to put the newborn* (and perhaps also some very young) *calves in a separate, clean room and feed them on tuberculosis-free milk.* Such calves will easily be kept free from tuberculosis in nearly all cases.

The *Cornell Veterinarian* (October, 1923) contains a reprint of a paper which I wrote for a congress at The Hague (Netherlands) in September the same year. Those who have read it will have seen that I described some examples of changing a highly tuberculous herd to a completely healthy and much more productive one, simply by means of isolating the calves year after year in a small compartment in the barn or some other building on the farm. This as a rule can be done at a very small expense. One of the farmers told me that he spent only two dollars and a half for some boards to make cribs of, in the barn. He tended his cattle himself, beginning with the healthy animals and using separate utensils for each herd. The result of his efforts was that in a lapse of four years (1912 to 1916) he changed his highly tuberculous herd of fifteen animals to a completely healthy one of twenty-six animals. The average yield of the cows increased from 129 kilograms of butter per cow annually to 164 kilograms (35 kilograms more butter per cow), which proves sufficiently how much better it is to have healthy cows than tuberculous ones.

Praise for American Methods

I highly admire the immense and admirably organized efforts you have made since 1917, in order to eradicate tuberculosis from your herds by means of the accredited-herd plan and the area plan, and I am sure you will reach your goal in this way, if the states will continue to cover the great expenses to indemnify farmers for their reacting animals. I do not at all wish to criticize your methods, but you may easily understand that I feel a

little astonished to see that you think it necessary to slaughter all reacting animals, even if they do not show the slightest symptom of tuberculosis except the reaction. A great number of such cows will never be affected in such a degree that their milk is apt to contain tubercle bacilli, and if it is a good pedigreed cow, she might every year bring forth a healthy calf, perhaps of still greater value. Of course I admit that nobody can tell with certainty if a reacting cow belongs to this category, or if the tuberculosis is inclined to grow and reach a contagious form, and that it therefore *may be safest* to slaughter it.

Modified Bang Method

If you are rich enough not to consider the expense, I do not at all object to your method, but I want to emphasize that it is possible to attain the goal in a much cheaper way—as we poor Europeans are obliged to try to accomplish it. I know there are, in your country, some farmers who oppose your method. I have of course no idea at all of the power of this opposition, but if there might come a time when the government was no longer so ready to cover the expenses as it has been for years, I dare to draw your attention to the plan I just pointed out to you. I think somebody here calls it *a modified* Bang method. I mean to have proved that every intelligent breeder, who understands the nature of tuberculosis, is able to change his tuberculous herd into a healthy one by simply isolating his calves year after year and keeping this young herd isolated from the old infected herd and by protecting the calves against infection through the milk. Compartments for young animals can be made very cheaply. The older animals—at least most of them—can be sold for slaughter after some years, and when the young herd has grown up, it may be transferred to the original cowstable after a very careful disinfection of it. If the owner still wants to keep a few of the old animals, he may put them in the compartment hitherto occupied by the young, eventually, after repairing this in some way. The young healthy herd must, of course, be tested with tuberculin every year.

This changing of a tuberculous herd to a healthy one takes some years, of course. I think it may be done as a rule in four to six years. It seems rather long, perhaps, but it must be remembered that the forming of a tuberculosis-free accredited herd also will take some years. The tuberculin test is not a 100 per cent reliable test, so that it will not very rarely happen

that there will be left in the herd one animal (or, in large herds, a few) which later on are found to be infected although they passed the test, and that will delay reaching the goal.

In some remarks relative to my paper the editor of the *Cornell Veterinarian* says that the fact that the Bang system has not met with general favor in this country possibly has been partly due to the fact that *milk and milk products from reacting cows have no market* in the state of New York, even after pasteurization, although raw milk from tuberculous cows finds its way in great quantities, since evidence of freedom from tuberculosis is not required. I admit that I cannot see the wisdom in the prohibition of the use of milk of reacting cows after pasteurization. Milk of reacting but apparently healthy cows, as a rule, is not infectious and *when it is pasteurized carefully, all possibility of infection is removed.*

In many European countries a good deal has been done in combating tuberculosis of cattle, but on the whole you cannot say that results are satisfactory or have always corresponded to the money spent for this purpose. Most has been done, I think, in the Scandinavian countries (especially Sweden), where the combat essentially has been based on my principles, the idea being to let the state help the farmers in their efforts to change their tuberculous herds to healthy ones. In Norway and in Finland, where tuberculosis is comparatively little widespread, public measures have been stronger than in Denmark and Sweden, insofar as reacting animals must be marked and are allowed to be sold only for slaughter, wherefore the owner receives a compensation.

The Ostertag Method

In Germany the fight has been based on the well-known ideas of v. Ostertag, which differ from mine insofar as he believes it possible, by means of carefully organized clinical examinations, to detect all cases of open tuberculosis and by slaughtering these animals, root out the disease so that it should not be necessary to maintain the isolation of the young animals which he admits to the cowstable, when they are pregnant. The reports from Germany show that his method is not a good one. It is impossible by clinical examinations to detect all cases of open tuberculosis. v. Ostertag is able to better the health conditions in the herd, but he can never get rid of the disease by his measures. At present this seems to be commonly admitted in Germany and

I have the pleasure to see that Dr. Haupt, of the veterinary faculty in Leipzig, recommends adopting my method, which has hitherto been considered as impracticable in Germany. In Hungary and Austria many great herds have been freed from tuberculosis by following my method.

Methods Used in Other Countries

The Netherlands has formerly spent a good deal of money, because the state offered to buy animals with open tuberculosis at a fairly good price. The idea was, of course, to try to get rid of such animals as soon as possible, but the farmers did not make use of this favorable offer as much as had been expected and after a few years it was given up as too expensive. The interest for combating tuberculosis is at present great in the Netherlands, but people do not quite agree upon the measures to be taken. In Friesland they do a good deal by means of cooperation between farmers and dairies, and the leading man there, Dr. Veenbaas, recommends measures which partly approach my ideas, but many veterinarians in other provinces reproach him for not forbidding the sale of reacting animals and claim that the disease has been spread from Friesland to other parts of the country by sale of such animals. At present, Dutch people do not wish to combat tuberculosis by means of direct regulations from the state, but recommend a voluntary fight by means of cooperation between the farmers with some help from the state. Great stress is constantly laid upon the rooting out of all forms of open tuberculosis. Also in France it seems to be the common opinion, that the hitherto used obligatory prophylactic measures must be given up and stress must be laid on a voluntary fight, which should be helped by the state. In England the slaughter of all cows with udder tuberculosis and of cattle affected with clinically detectable forms of tuberculosis is at present demanded. The idea is, of course, to diminish the spread of tuberculosis but even more so to procure tuberculosis-free milk for the public, especially for children.

You see, that in most European countries the greatest stress is laid upon the rooting out of all cases of open tuberculosis. I do not at all disapprove of this measure. It is, of course, a very essential thing, just as is in human society, taking away from the home consumptive persons who spread contagion by spitting, and I consider it to be very important that farmers understand that animals with open tuberculosis are very dangerous inhabi-

tants in a stable. I mean only that the rooting out of such animals can never have the effect to free a herd completely from the disease. It is a very essential help to the farmer who tries to raise a new healthy herd, especially if this must be done on the same farm, and I always recommend in such cases to control carefully the health conditions of the infected part of the herd, but when it is our goal really to free our herds from tuberculosis the rooting out of the said animals is not sufficient. The cleaning of a herd can be accomplished only by the farmers themselves, on the basis of real understanding of the nature of the disease. I am glad to know that on this point I am in full harmony with your opinion.

I thank you sincerely for having given me an opportunity to speak to you on a matter that has occupied my mind a good part of my life.

ARMY VETERINARIANS AT PHILADELPHIA

Among those in attendance at the Philadelphia meeting of the A. V. M. A. were six members of the Veterinary Corps of the Regular Army, as follows: Colonel W. George Turner, Washington, D. C.; Lieutenant-Colonel Robert C. Musser, Washington, D. C.; Captain Louis L. Shook, Washington, D. C.; Captain Frank H. Woodruff, Fort Hoyle, Md.; Captain Edward M. Curley, Cornell University, Ithaca, N. Y.; and Captain James R. Sperry, Fort Hamilton, N. Y.

BUREAU TRANSFERS

Dr. Edwin S. Ring (N. Y.-Amer. '13), from New York, N. Y., to North Walpole, N. H., in charge of meat inspection.

Dr. Clarence Upton (K. C. V. C. '15), from Albany, N. Y., to Evansville, Ind., on meat inspection.

Dr. James H. Coleman (U. S. C. V. S. '27), from Baltimore, Md,, to Montpelier, Vt., on tuberculosis eradication.

Dr. O. L. Lockwood, from Washington, D. C., to Baltimore, Md., on tuberculosis eradication.

Dr. Chas. G. Haber (O. S. U. '16), from Dayton, Ohio, to New York, N. Y., on meat inspection.

Dr. F. E. Theobald (Cin. '09), from Marion, Ohio, to Dayton, Ohio, on meat inspection.

Dr. W. L. Endsley (K. C. V. C. '10), from Fort Worth, Texas, to Wichita, Kans., on virus-serum control.

Dr. Clarence D. Stein (U. P. '11), from Omaha, Nebr., to Pearl River, N. Y., on virus-serum control.

Dr. Cloyde L. Gooding (Colo. '26), from San Francisco, Calif., to Sacramento, Calif.

THE VETERINARY PROFESSION: ITS RECOGNITION AND PERSONNEL*

By RAYMOND A. PEARSON, *College Park, Maryland*

President of the University of Maryland and Executive Officer of the Maryland State Board of Agriculture

I would be well pleased if I could say something this evening that will help you to accomplish two things which many of you are anxious to accomplish and are confident can be done. I would like to help you to gain better recognition from the public and I would like to help you to bring to the attention of the best young men of America, the exceptional opportunities that are offered by the veterinary profession.

My interest is due to my knowledge of the service and needs of the profession and this is based upon what I learned and what I absorbed from my older brother, Leonard, once president of this association. His activities centered in this city. He was devoted to the best ideals of the veterinary profession and he gave himself without limit to their promotion. His conception of the importance of veterinary science and its underlying sciences and of the dignity of veterinary practice, was convincing and inspiring to me.

MISUNDERSTANDING

A few months ago a popular weekly magazine, having nation-wide circulation, printed an article composed of one paragraph having eight lines and the title, "Passing of a Profession." It related that the president of a certain private veterinary school had sadly passed out the diplomas to his four graduates and then with a sigh announced that the college was thenceforth discontinued. The article closed with these words: "Few men care to become horse doctors."

The poor benighted editor! He did not know *why* that school closed nor the heroic struggle that had been made to save it, nor that better facilities have been provided elsewhere; nor did he know what is the purpose of veterinary education. I am sorry for him and the many supposed intellectuals who, like him, are so ignorant and so indifferent. They would dismiss and forget a great profession with an obituary of eight lines! Little do they think of what would happen if their ideas were realized. They

*Delivered at the sixty-fourth annual meeting of the American Veterinary Medical Association, Philadelphia, Pa., September 13-16, 1927.

do not know that soon after the disappearance of this profession different kinds of troubles would arise in different places that would provide subject matter for countless columns in the newspapers and learned editors would fill their pages with regrets that the profession was allowed to die and with demands that at any cost it must be started again and strongly maintained.

The Veterinarian and the Home

I would like to take by the hand the average citizen who has no special knowledge of what he owes to the veterinarian. I would lead him to his own home and ask him to throw away everything he has that was produced with the aid of the veterinarian—and many of the things could not be produced except with the aid of that gentleman. We would open the refrigerator and out would go the meat, milk, cream, butter, cheese, eggs and poultry. There might be some fish left and mineral water. Much of the bread, fruit, vegetables and canned goods also would go.

We would visit his bedroom and throw out the blankets and pillows and brushes. From his wardrobe we would take his overcoats and his favorite warm clothes. His shoes must go, too. Some of his linen and cotton bed clothes and wearing apparel would have to go. He could keep his silk neckties, and the moccasins he bought when traveling through a national park many years ago.

That man would learn what he owes to the veterinary profession. He would tell his neighbors and his preacher and his editor and doctor and his legislator and he would write to his governor and his congressman and plead with all of them to be fair to this old profession.

If you would get a man's attention, touch his health or the health of his family, or his comfort or his pocketbook. The veterinary profession does all of these.

National Prosperity and Health

The veterinary profession is necessary for a successful live stock industry. A successful live stock industry is necessary to successful agriculture. A successful agriculture is necessary to a prosperous nation. The veterinary profession, therefore, is one of the cornerstones underlying national prosperity.

Again, the veterinary profession is necessary to assure wholesome animal food-products, especially milk and meat. A wholesome food supply is necessary to public health. The veterinary

profession, therefore, is one of the chief factors responsible for national health and vigor.

Are there not some speakers, writers and artists who can show the public what they owe to the veterinarians? This subject is worthy of a Webster, a Fiske or a Sargent.

There is a fascinating opportunity to expand on this subject. The direct benefits of his work have been mentioned. Property values running into the billions of dollars are directly concerned. Farms, transportation companies, packing-plants, wholesale and retail meat and milk business are all more or less dependent upon the watchful eye of the well-trained veterinarian and sometimes the activities of these organizations must halt for a time while the veterinarian does his work.

Far-Reaching Effects

Pages could be filled with accounts of the far-reaching effects of veterinary research. Medical science has profited and the medical profession pays its tribute. Industry profits. Agriculture especially is benefited. Commerce is helped. One illustration must suffice.

Research in the veterinary field made the Panama Canal possible. Very few people know this. It is one of the most thrilling stories in the history of science. Under the direction of Dr. D. E. Salmon, who was chief of the U. S. Bureau of Animal Industry, Smith and Kilborne solved the secret of Texas cattle fever. This quickly and naturally led to the control of yellow fever and then—and not until then—it was possible to dig the canal. A monument to these men should be erected by the side of the Panama Canal to tell the world in all the years to come, how the ships of the great oceans were redirected because of veterinary research.

In a small way such a monument erected by our government would atone for the unjust treatment given to Dr. Salmon before and after the close of his great service at the head of our splendid Bureau of Animal Industry.

Opportunity in the Profession

Is there an opportunity in the veterinary profession for the best type of young men? Would they receive reasonable financial compensation, and would they have satisfactory scientific opportunity, and is the need for such service increasing? These are big questions and should be answered.

They should be answered for the benefit of many young men of college age who have a liking for animals and for science and who should prepare for the veterinary profession, but are turning away from it. The best of these should be helped to see the true picture—the present situation and the outlook.

Let us briefly state a few facts that will answer the above questions, for the benefit of the potential veterinarians, and those to whom they go for advice:

1. *Agriculture will "come back."* Already there are improvements in many sections. This great fundamental industry has suffered from two shocks: the war which hurt every peace-time industry, and certain readjustments which had to come within the industry. There are reasons to believe that a long period of agricultural prosperity is coming. The depression in agriculture is the chief reason for the discouragement of many veterinarians in the best rural sections. They depended upon farm practice—and the farm business was sick. Rural banks depending on farm business also were discouraged and many failed. All business depending on the farms suffered. As stated, the situation is improving.

2. *The value of live stock is increasing enormously.* In 1900 the value of live stock on farms in the United States was nearly three billion dollars. It is now over five billion dollars, an increase of over sixty-six per cent in twenty-six years. The increase is partly due to the larger number of pure-bred and high-value animals. The increase of such animals naturally creates more demand for veterinary service. We are told that the losses of animals from disease often amount in one year to as much as one to two per cent of the total value.

3. *Horses are not decreasing as much as is generally supposed.* There are not as many on the highways as formerly and this has given an exaggerated idea of their decrease. Automobiles will not eliminate horses. Thus far automobiles, trucks and tractors have not greatly reduced the combined number of horses and mules on farms although they have largely replaced animal power in cities. The automobile industry was getting started at the beginning of this century. In 1899, 3,700 passenger cars were made, and in 1910 the number of passenger cars and trucks produced was 187,000. In the period of ten years from 1900 to 1910 the number of horses and mules on farms increased over two and one-half million.

In the next ten years—from 1910 to 1920—the annual production of passenger cars and trucks increased from 187,000 to 2,205,197, or slightly over two million. In the same period the number of horses on farms slightly increased and the number of mules on farms increased 30 per cent, the combined increase being from 24,043,000 to 25,323,000, or 1,280,000.

From 1920 to 1925 the annual production of passenger cars and trucks increased from 2,205,197 to 4,157,830, or slightly less than two million. In the same period the number of horses and mules on farms decreased about three million but was larger than in 1900 when the automobile industry was starting. Last year there was another small decrease but the total number of horses and mules on farms continued larger than in 1900. The number of horses and mules may show further decrease and it may not. But any possible decrease in horses and mules in cities and country is more than offset by increases in other kinds of live stock. Furthermore, it may be added that there is now a renewal of interest in some types of horses.

4. *The increase in numbers and values of other kinds of live stock* constitute an immense and growing field of practice for veterinarians. In 1926 there were on farms in the United States

22,148,000 milk cows and heifers valued at $1,270, 521,000
37,000,000 other cattle and calves valued at . 1,019,754,000
52,055,000 swine (including pigs) valued at . . . 791,632,000
38,112,000 sheep and lambs valued at 418,965,000

Add to this the poultry industry with an annual production of fowls and hens' eggs valued at more than one billion dollars.

And add another large item for millions of small animals, including pet animals.

5. *The protection of this great array of animals against disease and the treatment of disease* when it appears is the big job of the veterinarian. Thus his work underlies success in farming and has an important relation to national health and prosperity. To the credit of the profession be it said that the veterinarians of the country, ably led by the Bureau of Animal Industry, have totally eradicated different highly contagious diseases of animals that have appeared from time to time. In every instance, where they have been given full control, they have been 100 per cent successful. Contagious pleuro-pneumonia and foot-and-mouth disease have appeared a number of times and always they have been conquered. Probably the same will be said of hog cholera and rabies when the veterinarians are given exclusive control.

Because of their work, glanders is a curiosity, dourine is a memory, the Texas-cattle-fever area is being constantly decreased, scabies is under control and lip-and-leg ulceration is no longer a menace to the sheep-raiser. "Hollow horn" and "wolf in the tail" were about the first to go, with the approach of the scientifically trained expert.

The eradication of bovine tuberculosis is making good progress. This work is thoroughly understood. The area plan is proved to be the logical plan. The limiting factor is funds and these are being provided more and more liberally by federal and state governments. The annual expenditure is now about $20,000,000.

The treatment of individual cases will always constitute an important service. Calls for such service increase in number as the quality of live stock is improved and the money value of the individual increases. Some practitioners are developing specialties, as is done by physicians. Even the diseases of poultry offer attractive opportunities.

6. *The Federal government, states, many municipalities and private concerns are employing many veterinarians* in responsible positions in connection with meat inspection, milk inspection, sanitary inspection, and the manufacture of biological products. The staff of the Bureau of Animal Industry includes 1360 veterinarians. Hundreds of others are serving as state, assistant state and municipal veterinarians. The growing importance of meat inspection is realized when we remember that about 115,000,000 animals are slaughtered in this country annually and the average man, woman and child consumes about 150 pounds of meat annually. Private concerns also employ many veterinarians because full-time service is needed.

7. While the veterinarian always will be trained especially to cope with disease and to prevent disease, he *should expect to cooperate more and more with the owner of live stock* in developing better types of animals. With his knowledge of the laws of animal life he will be able to assist in breeding, feeding, management and shipping. He will help to produce greater vitality, better productivity, while at the same time he shows how to avoid losses from disease. Some veterinarians who have accepted this broad conception have been appreciated more and more until now they are regarded as benefactors and are honored accordingly.

8. *The field of veterinary research has not been sufficiently emphasized;* it is one of the most important and interesting of

all the opportunities. The Bureau of Animal Industry and several states and some private concerns and individuals are well equipped for research and are producing results that are increasing our scientific knowledge and that apply to problems in the fields of veterinary medicine and public health and far beyond.

9. All these facts show the need for veterinarians, yet *it is a fact that there is a heavy decrease in the number of students in our veterinary colleges.*

In 1924 there were about 12,000 veterinarians in the United States and Canada. This number decreased by about 600 per year by reason of deaths and withdrawals. New veterinarians are being graduated at the rate of about 150 per year from the standard veterinary institutions of the United States and Canada. Until about eight years ago the number of graduates was substantially equal to the annual decrease. Secretary Hoskins reports that only 117 veterinarians were graduated this year from the 14 veterinary colleges in this country and Canada—the smallest number of record. This is an average of only about two veterinarians for each state and province. The shortage that is developing is now felt in many places. Large areas in our most important stock-raising sections are without veterinary service and offer lucrative practices to well-trained men. Attractive positions are not filled because of shortage of candidates. One leading veterinary college this year was asked to recommend men for eleven positions but could fill only five. One of these places pays $3,600.00 as municipal meat and milk inspector. Other places offered from $1,800.00 to $2,400.00.

10. *The veterinary profession requires educational training comparable with that required for other professions* and much more than was required for the medical profession when many physicians now active and successful were receiving their education. This profession is not only learned; it is dignified. In dignity and public respect and esteem it compares well with others, depending in any particular section upon the knowledge that the people of that section have concerning the work of the veterinarian and depending equally upon his personality and his public contacts. The same is true of every profession. They are all judged largely in any section by the character of the individuals who serve in that section. The newest or the smallest profession may be under something of a handicap in this respect, but a handicap fortunately that can be overcome.

It is gratifying from time to time to learn of veterinarians who are performing services outside of their profession, for the public welfare. Occasionally a veterinarian makes a creditable record in politics. Dr. James Withycombe became Governor of Oregon and was re-elected to the position. You have your mayors and other public officers. Often one is found as an outstanding unofficial leader in constructive citizenship. The name of Dr. W. H. Dalrymple will long be honored in Louisiana because of his fine public spirit and service, and many people in Pennsylvania will remember Dr. Rush Shippen Huidekoper because of his strenuous service in connection with the Johnstown flood. For quiet constructive service there are men in this audience who would be or should be designated as leaders in their home communities and some of them do not know it—the more to their credit. All these men are honoring their profession and helping to raise it in the estimation of all observers.

And now, in closing, I speak especially to the active men of the profession. Whatever the attitude of others may be, the chief responsibility for the future of the veterinary profession rests—and ought to rest—upon your shoulders. At least you should provide the leadership. Shall we allow the situation to run along as it has been going these last few years, with decreasing student enrollment, until a catastrophe comes and then take our punishment and our losses and then *perhaps* mend our ways?

We are headed for a catastrophe that will be comparable with the Mississippi flood. The appearance of a highly contagious disease of live stock and its uncontrolled spread would result in terrible losses. We know from experience.

The time has come for the recognition of the growing importance of the veterinary profession. Those in high position should give this recognition. The public generally should give it. They must and will do so if they are informed of the facts. Especially those in the profession should give this recognition because they know the facts. They and all concerned should bring these facts to the attention of young men who would be a credit to the veterinary profession. The young men will respond when they are correctly informed.

"Doctor, I'm sure I'm getting all the exercise I need."

"There's no indication of it."

"No wonder. You have only looked at my tongue. But you just ought to see the soles of my shoes."—*Boston Globe.*

STUDIES IN INFECTIOUS ENTERITIS OF SWINE
First Paper

By CHAS. MURRAY, H. E. BIESTER, PAUL PURWIN *and* S. H. MCNUTT

Department of Veterinary Investigation, Iowa State College, Ames, Iowa

INTRODUCTION

An extended study of the disease known as infectious or necrotic enteritis of swine was inaugurated about three years ago. The work has advanced to the extent that publication of some of the results of the study seems warranted. It was contemplated that the first paper to be submitted should be on the etiology of the disease, but the work on the pathology has progressed more rapidly and we are herewith submitting a report on the same. Some facts regarding the etiology seem to merit further confirmation. For present purposes we desire to announce that the work thus far carried out convinces us that the primary cause of this disease is the *Salmonella suipestifer*. Other organisms that have been incriminated by other investigators are, in our opinion, merely secondary invaders or play no role at all in the etiology of the disease. A second paper on the etiology of infectious enteritis will appear at an early date.

The findings and conclusions set forth in the following report are based upon a detailed study of the following material: 20 cases of infectious enteritis (so-called necrotic enteritis) obtained from the field, 43 cases of the same disease induced experimentally, material from two cases of human typhoid fever, material from three cases of human Balantidium colitis and button ulcers from one case of hog cholera.

After the field cases reached the laboratory, a routine urine analysis and fecal examination were usually made. In a number of cases blood examination also was carried out. Cultures from various organs and lymph-nodes were made immediately after destruction or death. In only a few instances was material used later than several hours after subjects had succumbed to the disease. Most subjects were destroyed in various stages of the disease and used immediately thereafter. In most cases pigs used for experimental feeding were subjected to fecal examination, and the absence of blood in the feces was determined.

This fact, together with a good physical condition and a knowledge of the source of our pigs for experimental purposes, reasonably assured us of healthy pigs. Furthermore, when healthy pigs were obtained for the purpose of producing the disease experimentally, some were kept over for a varying period without feeding culture, and in a manner served as checks, since no sickness nor fatalities occurred in such animals.

Material for histopathological study was collected immediately after cultures were taken. The pathological studies consisted of a systematic consideration of all descriptive factors insofar as they could be applied to each organ. Material from every organ or tissue was fixed in formalin and Zenker's solutions for microscopic study, regardless of the presence or absence of gross changes.

The cellular changes were studied after the usual hematoxylin and eosin staining of paraffin-embedded material. From two to six sections were taken from each organ for the study of cellular changes. Kockel's fibrin stain, after Zenker's fixation, was used in the detection of fibrin in exudates. The presence or absence of mucin in exudates was determined by Hoyer's staining method, after fixation in saturated solution of mercuric chlorid. Microscopic preparations to demonstrate the presence of bacteria in tissues also were made of all organs that showed inflammatory reactions in the preparations stained with hematoxylin and eosin. The purpose of the pathological studies was to determine the exact nature and genesis of the lesions, to form the basis for further studies of the problem. Towards the close of the work outlined above a group of fifteen healthy pigs was fed cultures of the suipestifer-type organism isolated from a field case. These subjects were destroyed at varying intervals, beginning eight hours and terminating 288 hours (12 days) after feeding. The purpose of this series was to demonstrate the consecutive order and character of the tissue alterations present in the different stages of typical cases and to aid in the interpretation of the histological changes and bacteriological findings in the field cases. While this constitutes a separate project, facts derived from observations made therein have been of material aid in interpreting some findings in the previous project.

History

Breed: Infectious enteritis is not confined to any one breed of swine.

Sex: Both sexes are included in the field and experiment groups.

Age: The ages varied from three to six months in the field cases encountered in this study.

Weight: In the field cases the weights ranged from 18 to 110 pounds, while the experimentally induced cases ranged from 25 to 70 pounds in weight.

Temperatures: The temperatures varied depending upon the stage of the disease—ranging from subnormal to 107° F.

The following are the thermic reactions of a representative selection of healthy pigs fed cultures of the suipestifer-type organism isolated from field cases of infectious enteritis:

Pig 7946:

Fed 100 cc of broth culture, Feb. 1, 1924.

Feb.	2	Temp. 102.4° F.	Good appetite
	3	" 106.3° F.	Anorexia
	4	" 107.0° F.	"
	5	" 106.6° F.	"
	6	" 104.2° F.	"
	7	" 104.4° F.	"
	8	" 105.0° F.	"
	9	" 106.0° F.	"
	10	" 104.9° F.	"
	11	" 105.0° F.	"
	12	" 105.0° F.	"
	13	" 106.0° F.	"
	14	Found dead.	

Well-developed lesions were noted. The same type of organism as that fed was re-isolated from this pig.

Pig 8408:

Fed 75 cc of broth culture, Nov. 30, 1923.

Dec.	1	Temp. 104.0° F.	Anorexia and diarrhea
	2	" 104.8° F.	" " "
	3	" 104.4° F.	" " "
	4	" 103.2° F.	" " "
	5	" 103.0° F.	" " "
	6	Died.	

Advanced lesions were present.

Pig 8407:

Fed 75 cc of broth culture, Nov. 30, 1923.

Dec.	1	Temp. 105.4° F.	Anorexia and diarrhea
	2	" 105.9° F.	" " "
	3	" 105.0° F.	" " "
	4	" 105.4° F.	" " "
	5	" 104.0° F.	" " "
	6	Died.	

Pig 8404:

Fed 75 cc of broth culture, Nov. 30, 1923.

Dec.	1	Temp. 104.0° F.	Anorexia
	2	" 106.2° F.	"
	3	" 104.8° F.	"
	4	" 104.6° F.	"
	5	" 104.4° F.	Anorexia and diarrhea
	6	" 104.8° F.	" " "
	7	" 106.0° F.	" " " Destroyed.

Pig 7948:

Fed 25 cc of broth culture, Feb. 1, 1924.

Feb.	1	Temp. 102.8° F.	Appetite good
	2	" 106.2° F.	Anorexia
	3	" 107.0° F.	"
	4	" 106.2° F.	"
	5	" 104.4° F.	"
	6	" 104.0° F.	"
	7	" 104.0° F.	Ate some
	8	" 104.0° F.	" "
	9	" 103.2° F.	" "
	10	" 103.2° F.	" "
	11	" 103.4° F.	" "
	12	" 103.8° F.	" "
	13	" 103.4° F.	" "
	14	" 102.8° F.	" "

This case apprently would have recovered. The subject was destroyed, February 18. Cultures were negative. The primary etiological agent lost much of its virulence when kept or grown in vitro. Its disease-producing power could in turn be enhanced by passage through pigs. It will be noted that subjects 8408 and 8407, fed 75 cc on November 30, succumbed in less than a week. This, of course, is a much shorter period than the usual duration

of the enteric fevers. Subjects 7946 and 7948 were fed a culture which had not been passed through animals for several months. The decrease in virulence may in part at least be attributed to this fact. The culture has been subjected to animal passage from time to time when it was needed during the course of experimental procedure, and no attempt has been made to establish a minimum lethal dose or a minimum dose that will produce a typical course of the disease with subsequent recovery. Massive doses were fed to produce intense, advanced, clean-cut lesions for pathological study and comparative purposes, since all tissues from human subjects are derived from succumbed subjects.

Several experimentally induced cases on which no daily temperature readings were taken showed subnormal temperatures when in a moribund condition prior to autopsy. The typical field cases presented a rough staring hair-coat and sunken abdomen or extreme emaciation. In the experimentally induced cases these changes were not so marked, except in a few that did not succumb rapidly.

Feces

Microscopic: Ascaris and Trichuris eggs,[35] *Balantidium coli* and *Trichomonas suis* were found in some, while not in others.

Reaction: Alkaline.

In practically every instance diarrhea was present. Its presence may be included as one of the diagnostic symptoms. In many cases blood could be demonstrated grossly in the feces, while in other cases dependence was placed upon the occult blood test. Before the test is applied the subjects should be kept off tankage or other feeds containing blood. The technic consisted of smearing a small quantity of feces on a glass slide or porcelain pallet and applying about five or six drops of the following freshly prepared reagent:

Benzidine—quantity carried on knife-tip
Glacial acetic acid—2 cc
Hydrogen peroxid—20 drops

When blood in minute quantities is present, a greenish-blue color appears almost immediately. Where diarrhea and gross or occult blood were absent, infectious enteritis could nearly always be eliminated, except in isolated field cases of long standing or where the infection was of low grade.

Urine

Odor: No deviations from that of normal hog urine were noted.

Reaction: Acid.

Specific gravity: Presented a wide range.

Indican: Usually absent except in several cases that showed traces; only one case giving a positive reaction.

Sugar: Nearly always negative, although several traces were recorded. One recovered or retarded case, described in a previously published report,[2] showed the presence of 6.6 per cent sugar in the urine.

Albumin: Negative.

Occult blood: Several suspicious reactions, all others negative.

Bile: Nearly always negative, although in several instances a pink reaction appeared in the Rosenbach's modification, while the ring test was negative.

Blood

Blood examination: No radical hematological deviations were found.[6] There usually appeared, however, a slight decrease in the percentage of hemoglobin, a slight increase in white cells and a somewhat constant slight increase in mononuclear leucocytes. After the third week, in human typhoid, an increase in ungranulated mononuclear cells also is noted.

During the first few days after feeding cultures, experiment subjects sometimes showed high hemoglobin readings and red-cell counts, no doubt caused by the rapid elimination of body fluids through diarrhea before hemorrhage began.[37] A similar condition prevails during the first week or more in human typhoid fever, blood counts remaining normal or higher through blood concentration produced by sweating and diarrhea, although an actual leucopenia prevails.

Mode of Death

Destruction was by means of stunning and axillary bleeding. The usual method of sticking was avoided in order to prevent pulmonary or thoracic hemorrhages. In those subjects that were destroyed, the autopsy was begun immediately after death. When animals were used that had succumbed to the disease in question, postmortem examinations were made very shortly after death, except in a few cases where several hours elapsed since death. Tissues for histopathological examination were taken simultaneously or immediately after inoculation of culture media.

General Examination

Abdominal and pelvic cavities: Both field and experimental cases usually contained varying quantities of a clear fluid and the serosa presented a gelatinous appearance. In those cases where the reaction seemed intensive, as in experiment pigs fed large doses of culture, the peritoneal exudate was abundant and varying numbers of petechiae were found on the gastric and intestinal serosa. In only three cases were necrotic lesions noted in the mouth or on the lips.

Systemic Examination

Tonsils: The extent and type of lesions of the tonsils seemed to bear no relation to the type or severity of the intestinal lesions. The appearance of the surface of tonsils did not always indicate the degree of cellular changes present beneath the epithelium. In some cases tonsils that appeared grossly normal on the surface showed gross or microscopic foci of caseation or abscess formation in the deeper structures. The majority of cases presented crypts distended with caseated material, which on microscopic examination revealed fragmented and caseated cells, leucocytes, and in some cases bacteria of the oral flora. In many intances changes in the tonsillar follicles were present, such as enlargement of the germ centers, slight leucocytic or eosinophilic invasion, or endothelioid cell proliferation. In some cases the interstitial tissue was also invaded in varying degrees by eosinophiles or leucocytes. Quite frequently particles of plant fiber were found embedded in the tonsillar tissue surrounded by caseation necrosis. Possibly 20 per cent of the cases studied presented no tonsillar alterations. One field case presented focal necrosis of the epithelium, with leucocytic infiltration extending into the submucosa. Another slide from the same tonsil showed an abscess, about 2 mm. in diameter, with several smaller ones having become confluent and several small foci where the keratin layer of epithelium was eroded and infiltrated by leucocytes beginning to invade the epithelium in deeper layers. Sections from this organ stained for bacteria showed in and over epithelial erosions the presence of bacteria of the oral flora, with one large diplococcus predominating. Another case showed a heavy strand-like organism in the pits where epithelium was eroded.

During the progress of the work three or four infectious enteritis subjects were submitted, from time to time, out of a herd in the locality, that seemed to possess some outstanding features.

Postmortem decomposition precluded the use of more than one case for detailed microscopic study. The one pig studied in detail possessed very advanced and apparently acute intestinal lesions and a very marked hemorrhagic infiltration and diffuse caseation necrosis of the epiglottis and surrounding tissue. Microscopic examination of preparations stained for bacteria showed the presence of a large, strand-like organism, in long chains, invading the mucosa and submucosa. In another subject from this herd the tonsils and peritonsillar tissue were the seat of an extremely advanced process of suppuration and caseation necrosis, as well as sloughing. The tonsils were transformed into caseated masses, quite loosely attached, being almost enucleated by the process.[15] Unfortunately postmortem decomposition eliminated this case from a detailed microscopic or bacteriological study. With the exception of the last case cited, the tonsillar changes were not related to the bacterial agents producing the intestinal changes, especially in view of the bacterial findings in histological sections and results obtained in cultures made from the tonsils of the progressive series. After relatively massive feeding and subsequent destruction after varying intervals, the suipestifer-type organism was not isolated from the tonsils. With one exception the incidence of tonsillar changes did not vary much, if any, from those encountered in routine autopsy examination of unselected general pathological material.

Stomach

The intensity of the gastric lesions varied in both field and experimental cases. Among the changes noted were edema, hyperemia, hemorrhage, leucocytic infiltration, heavy catarrhal, mucopurulent or fibrinous exudates, ulcerations and in some cases diffuse necrosis. Usually two or more of these general pathological processes were present. In the experimental series, where pigs were killed at varying intervals to show the genesis of lesions, the gastric changes varied in intensity, although they were seldom advanced as far as those found in the large intestine. The findings in a fairly advanced typical case were noted as follows:

Gross

Musculature and submucosa were swollen, presenting an appearance of fish meat. The serosa was swollen and watery.

Cardia: Mucous membrane presented a gray-slate color with a thin coat of mucus on the surface.

Fundus: The mucosa was a very brilliant red, with a thin coat of tenacious mucus. Inflammation had advanced and revealed some escape of blood. Necrosis was also present.

Pylorus: Desquamation and some erosions with fine film of mucin were noted. Congestion was absent.

Microscopic

Cardia: Examination showed advanced desquamation and early necrosis (no caseation), with superficial leucocytic infiltration at various points. Several exposed capillaries were found.

Fundus: Advanced diffuse hemorrhagic gastritis, with deep, early necrosis and exudation over surface, were revealed with necrophorus-like organisms in depths. The muscle was edematous, fibers and bundles were separated with faint traces of coagulated albumin of edematous fluid present. One section of fundus showed no necrosis, but presented diffuse edema and advanced desquamation and some cellular infiltration.

Pylorus: No congestion. Desquamation and some shallow necrosis (cytolysis) were found. Some fields showed mucin and cytoplasm flowing into lumen.

Mucin

Cardia: Numerous epithelial cells laden with mucin; desquamation with fine bands and strands of mucin, with epithelial cells embedded or enmeshed therein, were found.

Fundus: Examination showed mucin-laden cells and some mucin in exudate beginning to lose its affinity for the differential stain.

Bacteria

Cardia: Negative.

Fundus: On the surface were noted a layer of mucin and cellular detritus, with leucocytes beneath same. In the outer layer of exudate, nearly all of the organisms present resembled those of the suipestifer type, with others simulating those of the intestinal flora, while deeper in the mucosa nearly all were necrophorus-like organisms. One ulcerated area with numerous distended and broken vessels showed myriads of necrophorus-like organisms invading the interstitial tissue. Some vibrios were present.

Pylorus: This division of the stomach was negative for bacteria in sections.

At this point it should be noted that the inability to demonstrate the presence of organisms in the histopathological sections does not preclude their presence. Organisms must be fairly numerous before they can be demonstrated by this means with any degree of certainty, especially in preparations showing considerable cellular fragmentation in the early stages. Therefore, cultural methods will obtain organisms from organs that do not show them on direct microscopic examination of histological preparations.

In two cases only, a few specimens of *Arduenna strongylina* were present.

About forty per cent of the cases studied presented either gross or microscopic lesions of necrosis, while about thirty-five per cent of this group showed either suipestifer or necrophorus-like organisms invading or present in the depths of the necrotic membrane, by means of histological slide examination.

It was in the advanced cases, with a heavy exudate or caseated membrane, where suitable anaerobic conditions prevailed that the necrophorus-like organisms were present in the depths of the mucosa, and the suipestifer type in the upper and middle portions of the exudate or membrane.

The gastric lesions varied in intensity in both field and experimental cases. They did not always approach in severity the advanced and diffuse process found in the large intestine, nor did a relation always exist between the degree of changes found in the stomach and large colon of the same case. In some instances the changes found in the stomach mucosa fell within the scope of physiological changes due to active digestion—such as hyperemia and small amounts of mucin. Possibly the hydrochloric acid played some part in suppressing the action of the bacteria involved in some cases. Work is recorded wherein experimentalists produced intestinal lesions in animals by administering human typhoid cultures after the stomach and intestines were rendered alkaline with soda, and peristalsis was checked by opium.[36]

An epitome of the gastric lesions can be stated only in a broad manner, *i. e.*, the alterations ranged from a catarrhal gastritis to an advanced focal or diffuse caseation necrosis, with the formation of a diphtheritic membrane as in the large intestine. The fundus in most cases was the first division of the stomach to present reaction or changes.

Gastric Lymph-Nodes

The same types of changes as those found in the intestinal lymph-nodes were present in the gastric nodes. A selected case showing fairly advanced lesions presented the following picture, which is a representative of the average:

Gross

The nodes were swollen; cut surface bulged and wet, possessing a red color. The red was somewhat mottled with gray areas, simulating foci of necrosis.

Microscopic

Peripheral edema and folliculitis were present, together with focal leucocytosis, and endothelioid proliferation with cytolysis, karyorrhexis and early caseation. Leucocytosis was most marked around necrotic foci. The gastric lymph-nodes from one case where the stomach mucosa showed advanced congestion and hemorrhagic infiltration presented edema, congestion and leucocytic infiltration. The leucocytes were laden with brown pigment—hemosiderin from broken-down red cells taken up in the process of phagocytosis.

Duodenum

Gross

The wall was generally swollen as a result of edema and leucocytic infiltration. The serosa usually appeared watery. Mucosa in some instances showed merely a low grade catarrhal inflammation with a little exudate and slight desquamation; in others advanced inflammation with very heavy exudate of mucus, containing varying quantities of leucocytes or edematous fluid, together with a roughened surface as a result of desquamation, and in some areas shallow erosions. Possibly 20 per cent of the cases studied showed hyperemia or a yellow fibrinous exudate. The experimentally induced cases generally showed slightly more advanced changes than the field cases, usually a heavier and more turbid exudate and a greater number showed hyperemia.

Ascaris lumbricoides was found in about forty per cent of the subjects studied.

Microscopic

Most cases were characterized by desquamation. Edema as well as leucocytic infiltration was a consistently occurring deviation. This process sometimes was very advanced. In nearly

all such cases where infiltration was present, eosinophiles were found in varying numbers. A large cell[12,20,40] morphologically identical with the cell described as a globule leucocyte or Schollenleukozyte, was also found, sometimes in considerably large numbers, chiefly in the interstitial tissue of the mucosa and submucosa.

The globule leucocyte varies in size, often being five or more times as large as a red blood cell. Its nucleus is usually eccentrically located. The cytoplasm is composed of varying numbers of eosin-stained globular masses, often the size of red blood cells. In the larger cells where the nucleus is crowded against the periphery, the cell has the appearance of a small blood-vessel. This cell will be reported in greater detail elsewhere.

Caseation necrosis in the duodenum was not a common finding, only in relatively few cases of those studied was it present. About twenty per cent showed karyorrhexis or advanced desquamation.

Mucin: Mucin was present in many cells in nearly all pigs. In only a few instances was it demonstrated by specific stains in the form of an exudate. This product was either so diluted or altered by digestive juices or degeneration as to escape the differential stain. Several preparations in the series presented areas of deep necrosis.

Fibrin: In only two cases was fibrin found, in both instances being in and around ruptured blood-vessels in foci of necrosis. No fibrin was demonstrated free as an exudate on the surface of the mucosa.

Bacteria: In a few cases near the surface and at breaks in the epithelium suipestifer-type and intestinal flora organisms were present.

Jejunum

The jejunal changes were more advanced than those in the duodenum, although of the same type. Shallow caseation was more frequently present. Karyorrhexis was likewise more regularly found and extended deeper into the mucosa, sometimes to the muscularis mucosa. Leucocytic infiltration appeared more advanced and diffuse. Fibrin in eroded or injured vessels located in necrotic foci was demonstrated more often than in the duodenum, as well as free fibrin at the border of caseated foci. Bacterial findings in sections with suipestifer-type and necrophorus-like organisms present were demonstrated in about 10

per cent of the cases studied, but not nearly so numerous nor so deeply embedded as in the large intestine.

Globule leucocytes were present in quite a number of cases and in some instances laden with detritus.

The changes described above, especially the shallow caseation or karyorrhexis as studied microscopically, were not always recognizable at autopsy. Grossly, the mucosa merely showed a roughened surface simulating advanced desquamation.

Ileum

No distinction between field and experimental cases could be drawn, the process in type and severity being identical. The lesions ranged in degree from an advanced acute catarrhal ileitis, with marked edema and leucocytic infiltration, to a process at the other extreme described as follows: diffuse cellular infiltration, many crypts distended and greatly bulged as the result of caseated contents and exudate, caseation necrosis more diffuse and deeper than in duodenum or jejunum, being piled up above the surface under which was a zone of karyorrhexis and leucocytosis; some purulent folliculitis with caseation necrosis in agminated lymph-follicles. Several follicles were greatly swollen and infiltrated, bulging the mucosa above.

A cross section of the data obtained from a study of the ileum in the two series can best be expressed by the presentation of the details of a representative case, recorded as follows:

Gross

Serosa gelatinous. Cut surface of wall showed swelling, with blood oozing from submucosa. Mucous membrane presented a dull slate color, with some areas of injection. Between transverse and longitudinal folds appeared a yellowish, cheesy, fibrin-like material.

Microscopic

Serosal edema and cloudy swelling and edema of muscle were found. Between folds and crypts severe necrosis extended to submucosa. Slight caseation on the surface, but chiefly karyorrhectic necrosis, with marked leucocytic infiltration of entire wall was noted, the latter process being most advanced in and near necrotic foci.

Mucin: Numerous goblet cells and necrotic areas containing remnants of goblet cells were found. No definite mucin-staining

substance appeared in the exudate, although some preparations showed intact crypts beneath necrotic zones filled with free mucin.

Fibrin: Fibrin was present only at several foci of necrosis and ulceration, where capillaries were eroded (fig. 1). No definite surface exudation appeared, fibrin being found only in eroded vessels and in adjacent tissue where hemorrhage occurred.

Bacteria: Typical pictures, like those described in the cecum, except not quite so advanced or regular, appeared at the areas of ulceration. The organisms of the intestinal flora prevailed at the surface of the necrotic portion; suipestifer and necrophorus-like organisms occupied a deeper stratum; while at the base of the necrotic foci only necrophorus-like organisms were observed. No long chains were present, possibly because anaerobic conditions were not so complete as in those cases presenting a heavy, continuous, caseated zone on the surface, such as were found in the cecum and large colon. The ileum also was the seat of large numbers of globule leucocytes.

Ileocecal Valve

Focal or diffuse caseation was frequently present. Button ulcers were always absent.

Cecum

No differences were discernible in the general pathological process between the field and experimental cases. Some were more advanced than others. The relative depths of the various zones of reactions usually differed in field and experiment subjects. The record of a typical case is as follows:

Gross

The wall appeared two to four times its normal thickness, the mucosa being covered by a nearly continuous layer of necrotic tissue (fig. 2), particularly heavy in the folds. This diffuse, leathery, grayish-yellow covering or membrane could be pulled off in some places, leaving a denuded, red, granular surface. In other places the membrane was focal (fig. 3), while most frequently it was diffuse, very heavy and adherent (figs. 2 and 11), it being necessary to scrape same off before reaching the red underlying zone.

Microscopic

Mucosa had undergone complete necrosis (fig. 4). The upper half was composed of one mass of caseated tissue (fig. 5). Be-

neath this appeared a heavy band of karyorrhexis over a diffuse area of leucocytosis. The blood-vessels were tremendously injected. No mucous membrane structure remained. The inner circular muscle was disintegrated and being replaced by leucocytes and karyorrhexis (fig. 6). Specimens of *Balantidium coli* were present on the surface and in the caseated membrane in most slides.

Mucin: No mucin was demonstrable in caseated zone, possibly being so altered as to lose its affinity for differential stains. In some preparations, where caseation was not so deep, mucin was found in cells as well as in the lumen of crypts beneath, but upon advancing to the caseated zone it was not observed.

Fibrin: Usually an abundance of fibrin was present in and around the immediate vicinity of eroded blood-vessels (fig. 7), but farther away from such areas none could be demonstrated except for strands of suspicious-looking material, possibly partly decomposed or digested fibrin.

Bacteria: Suipestifer-type organisms appeared on the surface and upper edge of the caseated zone (fig. 8). Upon proceeding deeper, these decreased in number, while necrophorus-like organisms began to appear in greater numbers, so that upon reaching the base of the caseated zone and band of karyorrhexis, only necrophorus-like organisms appeared (figs. 9 and 10). In preparations where the caseated zone was very deep, the necrophorus-like organisms in the middle of same stained very poorly, showing many degenerated bacillary forms, while towards and in the karyorrhectic zone these organisms were more numerous, closely packed together and took a sharp intense stain, showing granules, presumably on account of more nutrient material and less products of bacterial metabolism in the recently disintegrated tissue. These extended into the upper portion of the zone of leucocytosis. Several preparations showed foci with no zone of caseation, but karyorrhectic zone exposed to the surface as a result of previous sloughing. In the other cases studied the same general picture prevailed, showing the usual three definite zones of reaction, beginning with the surface:

A. Caseation necrosis.
B. Karyorrhexis.
C. Leucocytosis.

The only variations between individual cases are in the relative depth and extent of these three processes.

In those field cases where the process was rapid, and in many experimental cases when the culture fed was highly virulent, the suipestifer reaction seemed to assert itself in the form of an unusually deep, rapidly formed zone of caseation necrosis and a narrower or sometimes barely perceptible band of karyorrhexis beneath, with the balance of the wall developing edema and leucocytic infiltration. Such cases showed a smaller number of necrophorus-like organisms in and beneath the caseated membrane. The bacilli were not in such long chains as in the cases of longer standing, where anaerobic conditions prevailed over a greater period of time. In the latter group myriads of suipestifer-type organisms were present in the caseated membrane and in the intestinal lumen in an almost pure culture. Histological slides and direct smears of the contents included extremely few and sometimes no Gram-positive organisms. The suipestifer-type organism predominated.

The possibility of recovery in infectious enteritis will be discussed in the latter part of this paper. However, in a few instances where the process appeared to be arrested, some interesting microscopic pictures presented themselves in the cecum. At the edges of several points of focal necrosis the epithelium was proliferating, with a tendency to grow over that portion of the mucosa that was denuded. In several other instances shallow necrotic fields were the seat of low flattened strands of epithelial cells above, suggesting a process of epithelial regeneration over a denuded mucosa.

Large Colon

Gross

The field and experimental cases were practically identical. The most advanced lesions were found in the anterior half of the large colon, gradually subsiding beyond that region. Generally, the first half showed a diffuse covering of caseation necrosis or true diphtheritic membrane formation (figs. 2 and 11), gradually subsiding further back, until it was supplanted by the appearance of large patches of caseation to smaller foci of same on a hemorrhagic or markedly congested mucosa. The thickness of the wall was frequently increased two or three times its normal, as the resu t of diphtheritic membrane formation, edema, congestion, leucocytic infiltration and, in a few instances, early connective tissue reactions. In a number of experimental and in a few field cases it was observed that when pigs were de-

stroyed shortly after the onset of diarrhea, there appeared in the middle portions of the large colon and, in some instances, in the cecum, discs or plates of somewhat firm intestinal contents 0.5 to 1.5 centimeters in diameter and several or more millimeters thick, somewhat firmly adherent to the mucosa. These were held to the mucosa by means of a turbid mucofibrinous exudate, in some instances leaving a shallow depression after being pulled off. In the underlying crypts dense, nearly solid masses of a necrophorus-like organism in chains were found upon microscopic examination of histological preparations (fig. 12). Many times the epithelium in such crypts showed advanced changes. *Trichuris suis* and *Ascaris lumbricoides* were present in some, but absent in most subjects.

Microscopic

The general process was like that described in the cecum characterized by the following zones of lesions (fig. 13):

A. Heavy caseated membrane (fig. 14), varying in thickness up to 3 mm., absence of cell outlines.

B. The above process merged into a zone of karyorrhexis (fig. 15), which varied in intensity in different subjects. The karyorrhectic zone frequently extended far into the submucosa, and in quite a number of cases involved the inner circular muscle.

C. Under the karyorrhectic zone appeared a variable dense zone of leucocytosis (fig. 16). In some cases this process involved the balance of the large colon. Advanced congestion was usually present in and under these zones (fig. 17).

Balantidium coli was present in some cases in great numbers, while absent in others, the presence of this not being correlated with the extent or intensity of the enteritis process. In most cases specimens were found in the upper regions of the caseated membrane, while in a few they were situated deeper. As a rule this organism did not advance beyond tissue already destroyed (figs. 18 and 19). In one case this parasite was demonstrated beneath the muscularis mucosa, several immediately above the muscularis mucosa, and several more within the solitary lymphnodes. These were exceptions to the usual findings. Their location and invasive power in the pig did not compare with the parasite, as demonstrated in sections of human intestines from cases of Balantidium colitis (figs. 20 and 21). A resistance on

the part of swine analogous to that in trichinosis might explain this difference in findings. In view of the fact that *Balantidium coli* and *Trichomonas suis* were not found in over 50 per cent of the subjects studied and that infectious or necrotic enteritis can be produced regularly by feeding cultures of a specific bacterium, the protozoan forms can be eliminated as the specific causative factor in this disease. What part, if any, *Balantidium coli* may play in producing pathological conditions would come within the scope of a separate project. Incidentally it might be mentioned that a number of times *Balantidium coli* was shown to contain bacilli. However, the only statement permissible in this paper is that this protozoon is not the cause of the specific infectious or necrotic enteritis encountered and studied in Iowa, in both its natural and experimental forms.

Mucin: Numerous goblet cells were present where caseation had not taken place; also areas of necrosis containing pools of mucin, which oozed out from cells undergoing retrograde processes. The advanced cases do not permit a statement as to the part played by mucin in the formation of the diptheritic membrane, owing to retrograde processes. This will be studied in detail in the progressive series previously mentioned.

Fibrin: This was present in the exudate around eroded vessels as well as in some blood-vessel remnants lodged in the necrotic process.

Bacteria: The typical picture presents the three arbitrary divisions or fields.

A. Suipestifer-type organisms in upper parts of caseation necrosis.
B. Necrophorus-like and diminishing numbers of suipestifer-type (fig. 22) organisms in intermediate part of caseation.
C. Dense masses of necrophorus-like organisms were lodged in the depth (base of caseation) and in the karyorrhectic zone, as well as in the upper portion of the leucocytic band. In those places where caseation was not advanced, and of shorter duration, necrophorus-like organisms were not so numerous and not in such long chains (chart I).

Small Colon

The changes in the small colon fell between two extremes, *i. e.*, an indifferent catarrhal colitis and an advanced caseation necrosis, resembling the lesions found in the cecum or large colon of severe cases. Swelling, caseation and infiltration, producing an intestine

often compared to a garden hose, were sometimes encountered. In such cases the zones of caseation, karyorrhexis and leucocytosis were identical with those of the cecum and large colon (fig. 23). The bacterial findings were likewise identical. A picture of a representative case of those most frequently found is described as presenting a hemorrhagic or highly congested mucosa, studded with foci of necrosis (caseation) of various shapes, sizes and degrees of intensity (fig. 11). Often sloughing was noted in subjects possessing caseation necrosis. Some subjects studied were characterized by intestinal contents in the form of discs or plates adhering to the mucosa, similar to those described in the large colon. When pulled off, these left shallow depressions.

Mucin: Findings varied—severe cases showed mucin above foci of cellular degeneration, flowing from such disintegrating cells into caseated exudate above or remaining on the crypt remnants (fig. 24). Several preparations presented a heavy, pure mucin exudate piled upon the mucosa.

Fibrin: Found chiefly in the ends of injured blood-vessels lodged in necrotic tissue (fig. 25).

Bacteria: Findings were noted similar to those reported in the large colon (fig. 26), except not so many necrophorus-like organisms in depth, as a rule the lesions not being of so long duration. Where fecal discs or plates were adherent to mucosa, as described previously, myriads of necrophorus-like organisms were demonstrated under the same. Where only desquamation and leucocytosis characterized the lesion, necrophorus-like organisms were not demonstrated in histopathological sections. A covering of exudate is necessary or must have been present where sloughing occurred to create anaerobic conditions favorable for the necrophorus organisms to establish themselves. *Balantidium coli* was also present in the small colon.

The intensity of the alterations in the small colon did not always run parallel with those in the large colon. Frequently very advanced changes in the large colon were present while only desquamation, leucocytosis and slight karyorrhexis were shown in the small colon. However, all subjects that possessed severe lesions in the small colon were characterized by similar or more advanced changes in the large colon and cecum.

The process of necrosis, karyorrhexis with croupous exudate or diphtheritic membrane formation in experimental cases was always first noted in the anterior large colon and cecum. From the latter part of the first half of the large colon this lesion

usually diminished in severity although outstanding cases were characterized by necrosis and extreme swelling, involving the entire large intestine to the anus.

Liver

Gross

The changes associated with this disease are those usually accompanying a general toxic or septic condition. No definite statement can be made regarding the typical gross picture of this organ. Often the liver was swollen and the cut surface bulged as a result of cloudy swelling, while at other times retrograde cellular processes were present but masked grossly by interstitial connective tissue proliferation.

Microscopic

Various degrees of cloudy swelling were present in almost every instance. Sometimes this process had advanced to the early stage of fatty degeneration. Various degrees of leucocytic infiltration were found, and in some this was associated with a central lobular congestion, several cases with the latter process showing a slight central lobular pressure atrophy. One or more of these microscopic changes were always present in uncomplicated subjects.

Osmic acid strain: Specimens of liver from two pigs prepared by the Marchi method revealed about a half-dozen minute fat droplets in each epithelial cell.

Bacteria: No bacteria could be demonstrated in histological sections stained for this purpose.

In addition to the above rather constant changes, a number of interesting general pathological changes were encountered, some of which may bear no relationship to the infection under consideration. Several cases presented no gross pathological alterations, but upon microscopic examination revealed hepatic epithelium alterations simulating a hydropic condition. The ectoplasm was very heavy, while the endoplasm was represented by only a few isolated strands or particles of pink-stained material. In some cases the nucleus appeared to be suspended or held in place by one or two pink-stained strands, that ran from it to the ectoplasm. The remainder of the cell usually occupied by the cytoplasm was unstained or absent. This alteration has been observed on several previous occasions in pathological material from other than infectious enteritis. Another field case studied presented a liver having a dark-red surface with numerous

regularly placed blue points, giving the capsule a stippled appearance. The cut surface bulged slightly and blood flowed freely from same. The organ was non-friable. Microscopic examination revealed a leucocytosis, slight granularity of the epithelium with active congestion. The interlobular connective tissue showed proliferation, especially where it left the capsule, producing the blue foci seen on the surface, while the congestion present between these foci formed the dark-red background noted in the gross specimen. In other cases, however, blue surface colorations of the liver capsule generally proved on microscopic examination to be foci of eosinophilic infiltration that could ofter be traced back to previous ascaris invasions. On the cut surface these latter foci (due to ascaris invasion), when large, generally appeared yellow and of a cellular texture, dipping into the liver substance. Those subjects presenting changes due directly or indirectly to ascaris invasion of the liver were ruled out in the tabulation of lesions of infectious enteritis.

GALL-BLADDER

Gross

Catarrhal inflammation of the gall-bladder was the prevailing lesion in uncomplicated cases. The intensity of this process varied greatly in different subjects. In some instances the bile was quite thin, light yellow in color, and contained only a small quantity of mucin. In other subjects mucin was present in great quantities, giving the bile a thick and tenacious character. In some cases portions of the bile had separated and formed dark flocculent particles suspended in a thin mucinous fluid, or was found thick and pasty.

Microscopic

Catarrhal cholecystitis varying in intensity was always present. Frequently the epithelial cells seemed to be given over entirely to mucin-production, several cases presenting a typical mucoid degeneration. In about twenty per cent of those studied, desquamation and some necrosis with slight sloughing were noted. Pits between epithelial folds filled with caseated cellular detritus were observed in two cases, their presence being noted grossly as pinhead-size, yellow, cheesy masses on and in the mucosa. Changes similar to those cited have been observed in the gall-bladder of swine in other septic conditions. Whenever this organ was invaded by *Ascaris lumbricoides* (about seven per cent of all cases), its changes were not used in the data.

Bacteria: Bacteria in sections were not demonstrated except in one case, where a number of rod-shaped particles simulating bacteria were present. However, cultures made from this location were nearly always present. However, cultures made from this location were nearly always positive.

Pancreas

Gross

In most cases this organ showed no changes. A great number, however, presented different degrees of congestion, but never advanced. Edema was observed in only a few instances.

Microscopic

Hyperemia was noted in microscopic preparations in about thirty per cent of those studied. Leucocytic infiltration was found in only ten cases, only one of these being very advanced. Fat necrosis was never demonstrated. Epithelium of the intertubular cell masses (islands of Langerhans) in only a few instances presented slight cytoplasmic fragmentation. The subjects of this project were not sick long enough to develop pancreatic changes that could be definitely associated with diabetes. It should also be borne in mind that diabetes is not a constant sequela of an infectious disease. However, a recovered case of infectious enteritis, showing almost complete obliteration of the intertubular cell masses, and eliminating 6.6 per cent sugar in the urine, was previously reported.[3]

Bacteria: Microscopic preparations examined for bacteria in sections were negative with one exception. In this case the edematous interlobular tissue was the site of numerous suipestifer-type organisms. This case was an exception to the usual findings in the pancreas. The changes observed were not specific alterations but of a general nature, such as might be present in any infectious or toxic disease. The pancreas of one subject, not considered in formulating the above statements, was invaded by a specimen of *Ascaris lumbricoides* measuring about six inches. In addition to advanced inflammatory and necrobiotic changes, this organ was the seat of globule leucocytes.

Larynx

In most cases this organ showed no alterations except a slight congestion or catarrhal inflammation when pneumonia or bronchitis was present. One case, however, revealed an advanced hemorrhagic infiltration with deep and diffuse necrosis involving

the larynx and epiglottis. On section great masses and bundles of a large, long bacillus in long chains appeared on the surface as well as deeply implanted in the tissues of this organ.

Lungs

A considerable number of cases presented pneumonia and contained lung worms. A few subjects were characterized by pneumonia with an absence of parasites. A slight edema and hyperemia are the only alterations that could in any way be correlated or connected with the infectious enteritis process.

Heart

The field cases nearly all presented retrograde processes. Grossly, this organ was generally flabby, possessed a grayish, cooked appearance and was somewhat friable. A few subjects showed slight valvular proliferations. Cloudy swelling was present in nearly all cases, while congestion was noticed in a few. In many subjects the nuclei of the cardiac muscle fibers were enlarged, as in marked stimulation. Several preparations by the Marchi method revealed minute black globules in the sarcoplasm visible distinctly only by oil-immersion examination. One field case possessed chronic adhesive pericarditis with marked retrograde changes in the muscle. This may have been secondary to a previous infection. The experiment subjects presented fewer changes, many none, possibly due to the shorter duration of the primary process. As a rule the changes observed were of the general nature found in parenchymatous organs in other infectious diseases.

Spleen

No distinction could be drawn between splenic changes in field and experimentally produced cases. About twenty per cent showed slight passive congestion, two of them presenting hemochromatosis. In an even smaller number a mild leucocytosis prevailed, one of which was characterized by eosinophilia. One case presented early lesions of interstitial connective tissue proliferation. Another subject (an experimental case) showed focal necrosis and leucocytosis with fields of suipestifer-type organisms demonstrable in histological sections. Cultural methods in most instances proved this organism to be present. Detection by direct microscopic examination of histological sections is possible only when bacterial invasion is heavy. The ingestion of a single mass culture probably accounts for the mass invasion, making their detection possible in sections of the last cited case.

About sixty per cent of both field and experiment subjects presented a microscopic picture similar to the following: Extensive areas of an endothelial-like tissue with abundant cytoplasm and round and oval nuclei. The cell outlines were irregular and the cells arranged in such a manner as to form an open mosaic with numerous small interstices filled with red blood cells. In many instances the cytoplasm appeared confluent with that of adjoining cells. These fields or patches, in over half of those cases studied, seriously encroached upon or obliterated the follicle, frequently very little of the latter remaining. In other cases these endothelioid proliferations appeared in the form of from two to five islands or patches around and beginning to oppress the follicles. Grossly, the follicles appeared enlarged and in some cases reddened, but microcsopic examination revealed the condition described above. Without magnification the newly formed tissue presented the apearpance of being a part of the follicle, making it appear red and enlarged, while in reality the follicles were atrophied.

A similar microscopic picture, although not of such intensity, has been previously noted in a limited study of tissues from a series of pigs on a deficient ration, as well as in a number of specimens obtained from the abattoir. The presence and advancement of this change can be noted only without reference to its relation to the pathology of infectious enteritis, until a more thorough study of spleens from different sources, based upon differentially stained preparations, has been made, it being impossible to classify these cells definitely from a morphological study of preparations stained with hematoxylin and eosin.

Mandibular Lymph-Nodes

No distinction could be drawn between field and experimental cases. The alteration in some subjects consisted of only slight edema, mild leucocytic infiltration or congestion. Others were the seat of advanced congestion and leucocytic infiltration on the follicles, folliculitis, with early and advanced germ-center reactions (leucocytosis, endothelioid proliferation and cytolysis), and focal karyorrhexis. Several times leucocytes laden with brown pigment were seen. An advanced case was described briefly as follows:

Gross

Nodes enlarged, but no congestion, cut surface showing a light and dark-gray mottled appearance, suggesting foci of

necrosis, similar to those found in the mesenteric lymph-nodes (fig. 27).

Microscopic

Large areas of karyorrhexis with extensive fields of leucocytosis were found.

Abdominal Lymph-Nodes

The alterations in the lymph-nodes of the liver, stomach, small and large intestines do not require individual description except a few comparative statements. Advanced lesions were usually found more consistently in the mesenteric nodes of the ileum (fig. 27). The mesenteric and serosal blood-vessels were injected. The lymph-nodes connected with the cecum and large colon were frequently equally involved, while in some severe, advanced cases they showed even more necrosis than those of the ileum.

The gastric and hepatic lymph-nodes presented wide variations. The changes in these groups ranged from a slight enlargement, edema and mild leucocytic infiltration and traces of congestion in some cases, to a process showing all the above-mentioned lesions in an advanced degree, together with karyorrhexis and often caseation necrosis. A typical severe, advanced case, taken from a node in the mesentery of the ileum, presented the following picture:

Gross

Nodes were swollen to about twice their normal size, showing marked congestion. The cut surface bulged and a turbid blood-stained fluid flowed from same. Upon scraping off the fluid, the cut surface presented a mottled gray and yellow appearance, suggesting foci of necrosis.

Microscopic

Examination revealed marked congestion and advanced inflammatory edema, diffuse and dense focal leucocytosis, with numerous patches of karyorrhexis and early caseation.

Fibrin: Several advanced cases showed vessels with fibrin in the lumen and surrounding tissue, from capillary oozing or marked hemorrhage in some instances.

Bacteria: In a few acute cases bacteria were demonstrated in sections. Globule leucocytes were seen in sections from mesenteric lymph-nodes.

Kidneys

No definite distinction could be drawn between the field and experimental cases, except in those of longer standing, which

frequently presented a slight interstitial leucocytic infiltration. As a rule the kidneys possessed a cooked appearance and were enlarged in varying degrees. In these cases the cut surface bulged and the capsule stripped with ease. Less frequently the surface presented a reddish-brown mottled appearance. Glomerular congestion was present in only a few cases. Usually the cortex showed brownish-red and gray lines, and in a small number brownish-red and grayish-yellow alternating lines.

Microscopic

Varying degrees of cloudy swelling were nearly always present, in some instances this process having advanced to cytoplasmic fragmentation. Slight fatty degeneration was noted in ten per cent of the cases. Those of longer standing showed slight leucocytic infiltration. Two cases presented several foci of small hemorrhages in the medulla. One case (experimental) revealed foci of karyorrhexis.

Congestion when present was usually slight and not diffuse. The incidence of renal retention cysts was about the same as encountered in the examination of other pathological material and not correlated with infectious enteritis. In general the kidneys showed changes like those occurring in parenchymatous organs in many infectious diseases. Subcapsular hemorrhages such as those present in hog cholera were absent.

Other Organs

Ureters and bladder: These organs were free from pathological alterations.

Nervous system: During the early stages of the work, gross and microscopic examination revealed no cellular changes. Further work on this system was discontinued after reasonable efforts.

Muscles of gluteal region: The muscles of this region frequently presented a marked granularity of the sarcoplasm and masking of striations in advanced cases, but no consistent specific diagnostic alterations were found.

Thyroid: In those cases in which this gland was sectioned no pathological processes were evident.

General and Comparative Statement Regarding Intestinal Lesions

Conclusions reached after this study are that the suipestifer-type organism acts as the primary etiological agent, producing

an injury with subsequent exudation and necrosis of the epithelium of mucosa and underlying tissues. After tissue destruction or injury the necrophorus-like organism invades and multiplies in and under these fields of reaction, where anaerobic conditions prevail, favorable for the growth and activities of the *Actinomyces necrophorus*. In experimental cases destroyed during the early stages of the disease, the zone of caseation just having been formed will frequently reveal a nearly pure culture of the suipestifer-type organism (observed in histological sections) with only a small number of necrophorus-like organisms arranged in a few short chains at the edge of tissue still retaining life, or in the early stages of retrogression. In subjects running a longer period were found a large number of necrophorus-like organisms in dense masses arranged in long chains and skeins; likewise a broader zone of karyorrhexis (chart I). Cultural efforts were exerted chiefly towards confirming the consistent presence and pathogenesis of the suspected etiological factor, and its ability to reproduce consistently the disease by feeding. The results were checked by a careful study of the pathological picture produced each time.

The organism found in histological preparations and referred to as a necrophorus-like organism is, in our minds, the *Actinomyces necrophorus*, on which our studies will be more closely focused. Only limited work has been done up to the present time to corroborate our opinion regarding this anaerobic invader. Several typical cases in the series reported were used for this purpose. Sections of gut showing typical lesions of infectious enteritis were held under tap water, and the caseated or diphtheritic membrane scraped off with a clean scalpel until the live tissue zone was reached, followed by a further rinsing with distilled water. Further scrapings with a fresh sterilized scalpel were then taken from this surface and placed in sterile saline solution. From 0.25 to 2.5 cc of this emulsion was passed through three or four rabbits, each by one of the following methods: intramuscularly, subcutaneously, or intravenously. After death or lapse of five or six days, material from the lesions developed was passed through several series of rabbits.

In each case, after passage through several animals, the muscle lesions in the gluteal region revealed in smear preparations a pure culture of a long Gram-negative bacillus, morphologically similar to the *Actinomyces necrophorus*. The lesions showed no suppuration, but a dry, cheesy necrosis, filled with the long slender rods

referred to, as demonstrated by histological sections stained by the Gram method or with hematoxylin and eosin.

It is possible that any agent that can produce exudation and injury to the intestinal mucosa may create in this manner conditions favorable for the growth of the necrophorus organism. It was because of this assumption that a study was made of a limited available supply of human typhoid lesions and another set of tissues from hog cholera "button ulcers." The human typhoid material consisted of embedded blocks of intestine. One case showed, in a small section, desquamation and infiltration by leucocytes and large mononuclear cells, with areas of caseation necrosis. In the remainder, congestion, some granulation tissue with dense masses of lymphocytes, leucocytes and some mononuclear cells were evident. Preparations stained specifically for bacteria presented a caseated zone, the depths of which were infiltrated by long chains (figs. 28 and 29) simulating necrophorus organisms.[33] The upper zones harbored colon-typhoid-like and intestinal flora organisms.

It should be noted that the favorable point of attack of the human typhoid organism is at the intestinal agminated and rarely the solitary lymph-follicles, while the paratyphoid organism attacks and invades the mucosa more diffusely and does not confine itself to the lymph-nodes. The suipestifer-type organism behaves in swine in the same manner as the paratyphoid organism does in the human.

It is possible that *Actinomyces necrophorus* may be a secondary invader in the human enteric fevers and in intestinal diseases of swine characterized by caseation, as was found in the specific infectious enteritis under consideration, commonly known as necrotic enteritis.

Microscopic examination of the "button ulcers" of hog cholera revealed a lesion more advanced or of longer standing than those of infectious enteritis, but of the same general nature, except localized in the lymph-follicles of the intestines.

The "button ulcers" were characterized by the following recorded description:

Microscopic:

(1) The inner zone bordering on the lumen showed complete caseation necrosis with a few cell shadows and poorly stained eosinophile-like cells with round nuclei. Beneath this zone appeared a band of bacteria.

(2) Beneath the above appeared a zone of caseation that also presented karyorrhexis.

(3) A broad zone of karyorrhexis and round-cell infiltration was noted beneath the above.

(4) A zone of round-cell infiltration, with numerous round nucleated eosinophile-like cells, was observed under the third zone.

(5) A zone of connective tissue and some eosinophile-like infiltration formed the base of the lesion.

Bacteria: Some areas showed colon-typhoid-like organisms and intestinal flora near the surface. Beneath this appeared colon-typhoid-like and necrophorus-like organisms. In the depths of lesions were found myriads of necrophorus-like organisms. At the lateral edges of ulcers appeared numerous *Balantidium coli* containing organisms resembling *Actinomyces necrophorus.* Other slides did not always show such a clean-cut bacterial picture as found in those described above. Although the "button ulcer" lesion could be divided into more zones of cellular reaction and presented a few minor differences from the suipestifer reactions, the lesion presented an analogy in regard to the secondary invaders.[38]

During the course of this study two subjects were received from the field described as cases of "bloody diarrhea." These subjects are mentioned because of several differences in findings from the typical cases of infectious enteritis. The one subject died during the night and no cultures were taken. Tissues from this case presented caseated necrotic foci in the mucosa. From some of these foci blood oozed through the caseated mass from below.

Microscopic

The folds of the mucous membrane had undergone caseation necrosis extending deeply into the submucosa. Considerable fibrin and leucocytic infiltration were found in the lesions. The process gave indications of being a rapid one.

Bacteria: Mixed flora to submucosa, including large numbers of spirilla, were noted. In the depth of the submucosa, fields of organisms resembling *Actinomyces necrophorus* were seen. Other slides presented slight variations. Spirilla were not noted in the typical infectious or necrotic enteritis subjects. The gross changes also differed from the other subjects dealt with. From the caseated foci gross blood was oozing, which was not a feature

of the cases in the suipestifer-type enteritis. The second animal, a similar case clinically diagnosed blood diarrhea, was placed in a pen with healthy pigs, but we were unable to transmit the disease in this manner.[41]

Prognosis

A number of times groups of four or five pigs affected with infectious enteritis were brought to the laboratory from the same herd. Clinical observations were checked by a chemical examination of the feces to assure having active typical cases for bacteriological and pathological study. It was not always possible to work on all such subjects immediately and some were held over for varying period. They were placed in cement-floored pens, that were cleaned and washed frequently. It was noted often that subjects in these reserve lots recovered or showed signs of improvement or arrest of the disease, without medication. Those which were too far advanced continued to retrogress and finally died. In others where the process seemed arrested or healed, the pigs did not recover completely, but remained stunted, developed pot bellies and retained a rough, staring hair-coat. When such cases were held over for a long period, the feces became free from blood, and autopsy revealed an absence of caseation or karyorrhexis, the mucosa presenting merely a roughened surface, regeneration having taken place. It was from this latter group that the diabetic subject with pancreatic lesions, referred to previously, was obtained.

Conclusions

1. *Salmonella suipestifer* was found to be the primary etiological agent.

2. *Actinomyces necrophorus* appeared consistently as a secondary invader.

3. *Balantidium coli* and *Trichomonas suis* were eliminated as specific causative factors in infectious enteritis of swine, while in the small number of human intestines studied *Balantidium coli* possessed marked properties of active primary invasion of the tissues. In over 50 per cent of the cases of infectious enteritis studied, *Balantidium coli* and *Trichomonas suis* were absent.

4. Infectious or necrotic enteritis was consistently induced experimentally by feeding broth cultures of the suipestifer-type organism, which could be re-isolated and in turn passed through successive series of pigs, producing typical lesions in these.

5. The intestinal lesions in well-developed cases of infectious enteritis were characterized by three zones of reaction: caseation necrosis, karyorrhexis and leucocytosis.

6. The primary causative organism was found most abundantly in the upper portions of the lesion, where aerobic conditions prevailed.

7. The consistent secondary invader was found in the deeper strata of the lesions, where anaerobic conditions prevailed.

8. A limited number of sections of intestine from human typhoid fever presented a large strand-like organism in the deeper portions of the lesions, resembling *Actinomyces necrophorus*.

9. Button ulcers of hog cholera were characterized by some features present in the lesions of infectious enteritis, with some modifications. *Actinomyces necrophorus* was found in the deeper portions of the lesion.

10. One case of "bloody diarrhea" revealed numerous spirilla in the intestinal lesions. This case presented some features not present in the infectious enteritis lesions.

BIBLIOGRAPHY

[1]Basset, J.: Contribution a l'etude de la Maladie de Schmorl. Bul. Soc. Cent. Med. Vet., lxii (1908), p. 345.

[2]Birch, R. R.: Hog Cholera (Macmillan Co., New York, 1922), pp. 30-32,40, 53, 55.

[3]Biester, H. E.: Diabetes in a pig showing pancreatic lesions. Jour. A. V. M. A., lxvii (1925), n. s. 20 (1), pp. 99-109.

[4]Boyd, W. L.: Necrobacillosis. Proc. 21st Ann. Meet., U. S. Live Stock San. Asso., (1921), p. 78.

[5]Brandt, W.: Uber Balantidien-Enteritiden und ihre Therapie. Abst. Cent. für Bakt., Parasitenkunde, etc., lxxvii (1924), p. 95.

[6]Buckmaster: Morphology of Normal and Pathological Blood, (P. Blakiston's Son & Co., Philadelphia, 1906), pp. 95-100.

[7]Danish, F.: Balantidiencolitis kombiniert mit Typhus abdominalis. Zlb. f. Bakt., xcii (1924), p. 104.

[8]de Lavergne, V.: Intestinal lesions in typhoid. Abst. in Jour. Amer. Med. Asso., lxxxii (1924), p. 339.

[9]de Lavergne, V.: Paratyphoid penetration in lymph glands. Compt. Rend. Soc. Biol., xc (1924), p. 1429.

[10]Dürck, H.: Special Pathological Histology, (W. B. Saunders & Co., Philadelphia, 1901), I, pp. 144-145.

[11]Ernst, W.: Uber Nekrosen und den Nekrosebacillus (Strept. necrophora). Monat. f. prak. Tierheil.,xiv (1903), p. 193.

[12]Ferrata, A.: Sui Globuli Bianchi Mononucleati. Arch. per. le Scienci Med., xxx (1906), pp. 217-249.

[13]Fitch, C. P.: Necrobacillosis. Proc. 22nd Ann. Meet., U. S. Live Stock San. Asso., (1918), p. 135.

[14]Frohner u. Zwick: Pathologie und Therapie der Haustiere (verleg von Ferdenand Enke, Stuttgart, 1919), II, Pt. 1, pp. 226-264.

[15]Frommel, E., & Grasset, E.: Manifestations of typhoid in mouth and throat. Case of gangrene of tonsils in paratyphoid. Rev. Med. de la Suisse, xliii (1923), pp. 92-97.

[16]Glässer, K. Krankheiten des Schweines (verlag von Schaper, Hannover, 1912), pp. 169-177.

[17]Green & Scully: Diet in treatment of Balantidium colitis. Jour. Amer. Med. Asso., lxxxi (1923), p. 291.

[18]Hegner, R. W.: Carnivorous diet in treatment of flagellate diarrhea. Jour. Amer. Med. Asso., lxxxiii (1924), pp. 23-24.

[19]Hutyra & Marek: Pathology and Therapeutics of the Diseases of Domestic Animals (3rd ed.; Alex. Eger, Chicago, 1926), II, p. 423.

[20]Keasby, L. E.: On a new form of leucocyte (Schollenleukozyt, Weil) as found in the gastric mucosa of the sheep. Folia Hematologicia, xx (1923), pp. 155-171.

[21]Kinsley, A. T.: Necrotic enteritis. Vet. Med., xvii (1922), pp. 227-228.

[22]Kinsley, A. T.: Swine diseases. Amer. Jour. Vet. Med., (1914), pp. 208-209.

[23]Loeper, M., & Marchal, G.: Paratyphoid bacilli in blood in pneumonia. Abst. in Jour. Amer. Med. Asso., lxxix (1922), p. 1274.

[24]Luger, A.: Spirochete enteritis. Abst. in Jour. Amer. Med. Asso., lxxviii (1922), p. 854.

[25]McFarland, G. B.: Textbook of Pathology (2nd ed.; W. B. Saunders & Co., Philadelphia, 1910), p. 513.

[28]Mohler, J. R., & Morse, G. B.: *B. necrophorus* and its economic importance. Ann. Rpt., U. S. B. A. I., (1904), p. 76.
[27]Mohler, J. R.: Sheep bot. U. S. B. A. I. Bul. 63 (1904).
[28]Mohler, J. R., & Morse, G. B.: Necrotic stomatitis. U. S. B. A. I. Bul. 67 (1905), pp. 12-42.
[29]Muller, H. R., & Lincoln, J. S.: *Bacillus aerogenes capsulatus* infection complicating typhoid fever with report of a case. Med. Rec., ci (1922), p. 190.
[30]Ravenel, M. P.: Lesions of typhoid fever produced by *Bacillus faecalis alcaligenes*. Jour. Amer. Med. Asso., lxxvi (1921), p. 720.
[31]Ribbert, H.: Allgemeine Pathologie und Pathologische Anatomie (4th ed.; verlag von F. C. W. Vogel, Leipsig, 1911), pp. 506-511.
[32]Rochaix, A., & Blanchard, A.: *Bacillus faecalis alcaligenes* responsible for certain mild typhoidal and other conditions. Ann. de Med., viii (1920), p. 173.
[33]Rodet, A., & Bonnamour, S.: Secondary infections in typhoid. Abst. in Jour. Amer. Med. Asso., lxxviii (1922), p. 469.
[34]Semerau, M.: Pathogenesis of dysentery. Abst. in Jour. Amer. Med. Asso., lxxxi (1923), p. 1915.
[35]Sheather, A. L.: The detection of worm eggs in feces of animals and some experiments in the treatment of parasitic gastritis in cattle. Jour. Comp. Path. & Therap., xxxvi (1923), p. 71.
[36]Stengel & Fox: Textbook of Pathology (7th ed.; W. B. Saunders & Co., Philadelphia, 1921), pp. 303, 677.
[37]Tyson, James: The Practice of Medicine (5th ed.; P. Blakiston's Son & Co., Philadelphia, 1911), pp. 1-40.
[38]U. S. B. A. I.: Hog cholera: Its history, nature and treatment as determined by investigations. Gov't Printing Office, Washington, (1889).
[39]Webster, L. T.: Microbic virulence and host susceptibility in paratyphoid enteritidis infection of white mice. Jour. Exp. Med., xxxviii (1923), pp. 33-54.
[40]Weil, P.: Uber die Leukozytären Elemente der Darmschleimhaut der Saugetiere. Arch. f. Mikr. Anat., xciii (1919), p. 1. (Now Arch. f. Mikr. Anatomi und Entwicklungs Mechanik.)
[41]Whiting, R. A.: Swine dysentery. Jour. A. V. M. A., lxiv (1924), n. s. 17 (5), p. 600.

INDEX TO FIGURES

FIG. 1. Infectious enteritis. (Field case.) Ileum. Exposed capillary with coagulation and plugging of portions where wall ruptured or involved by necrosis. Kockel's fibrin stain. x 395.

FIG. 2. Infectious enteritis. (Experimentally induced.) Cecum, ileocecal valve and large colon, showing advanced necrosis. Edge (A) shows thickness of wall and different zones described.

FIG. 3. Infectious enteritis. (Experimentally induced.) Cecum, ileocecal valve and ileum. A, hemorrhage; B, focal and diffuse necrosis; wall swollen.

FIG. 4. Infectious enteritis. (Field case.) Extremely heavy zone of caseation necrosis. x 27.

FIG. 5. Infectious enteritis. (Experimentally induced.) Cecum. Advanced typical lesions, sloughing in some areas. A, zone of caseation; B, zone of karyorrhexis; C, zone of leucocytosis. x 30.

FIG. 6. Infectious enteritis. (Field case.) Cecum. Leucocytosis, karyorrhexis and early caseation of musculature. x 360.

FIG. 7. Infectious enteritis. (Field case.) Cecum. Remains of a fibrin-plugged vessel (A) located in necrotic zone. Kockel's fibrin stain. x 360.

FIG. 8. Infectious enteritis. (Field case.) Cecum. A, intestinal flora; B, suipestifer-type and necrophorus organisms. x 880.

FIG. 9. Infectious enteritis. (Experimentally induced.) Cecum. Necrophorus organisms in depth of lesion. x 880.

FIG. 10. Infectious enteritis. (Experimentally induced.) Cecum. Dense masses of necrophorus organisms in depths of mucosa under caseated zone. x 880.

FIG. 11. Infectious enteritis. (Experimentally induced.) A, large colon, complete deep necrosis; B, small colon, advanced hemorrhage and focal necrosis.

FIG. 12. Infectious enteritis. Large colon. Mass of necrophorus organisms in crypt under "fecal disc." x 790.

FIG. 13. Infectious enteritis. (Experimentally induced.) Large colon. Three typical zones A, broad zone of caseation; B, karyorrhexis; C, leucocytosis. x 27.

FIG. 14. Infectious enteritis. (Experimentally induced.) Large colon. Caseation necrosis. x 375.

FIG. 15. Infectious enteritis. (Experimentally induced.) Large colon. Karyorrhexis over zone of leucocytosis. x 375.

FIG. 16. Infectious enteritis. (Experimentally induced.) Large colon. Karyorrhexis and leucocytosis in submucosa. x 375.

FIG. 17. Infectious enteritis. (Experimentally induced.) Large colon. Congestion and leucocytosis. x 375.

FIG. 18. Infectious enteritis. (Field case.) *Balantidium coli* in necrotic areas, but no invasions into intact tissue, such as characterize human lesions.

FIG. 19. Infectious enteritis. (Field case.) *Balantidium coli* in exudate, with no invasions of intact tissue. x 110.

FIG. 20. Active or primary invasion of human intestine by *Balantidium coli*. x 370.

FIG. 21. *Balantidium coli* in section of human intestine, showing marked invasive power. Organism adjacent to muscularis mucosa, having advanced through an intact mucous membrane. x 370.

FIG. 22. Infectious enteritis. (Experimentally induced.) Large colon. Necrophorus organisms in depth invading with some suipestifer-type present. x 880.

FIG. 23. Infectious enteritis. (Experimentally induced.) Small colon, showing necrosis and some exudation or sloughing.

FIG. 24. Infectious enteritis. (Field case.) Cecum. Goblet cells and nearly normal mucosa adjacent to a necrotic area. Hoyer's mucin stain. x 90.

FIG. 25. Infectious enteritis. (Field case.) Small colon, showing an exposed distended capillary plugged with fibrin. Kockel's fibrin stain. x 345.

FIG. 26. Infectious enteritis. (Experimentally induced.) Small colon. Lumen contains masses of necrophorus and suipestifer-type organisms. x 855.

FIG. 27. Infectious enteritis. (Experimentally induced.) Small intestine, showing injected mesenteric vessels and swollen lymph-nodes with mottled appearance (necrosis microscopically).

FIG. 28. Human typhoid fever. Intestine, showing necrophorus-like organisms beneath caseated focus. x 850.

FIG. 29. Human typhoid fever. Intestine, showing necrophorus-like organisms beneath caseated focus. x 850.

Fig. 1

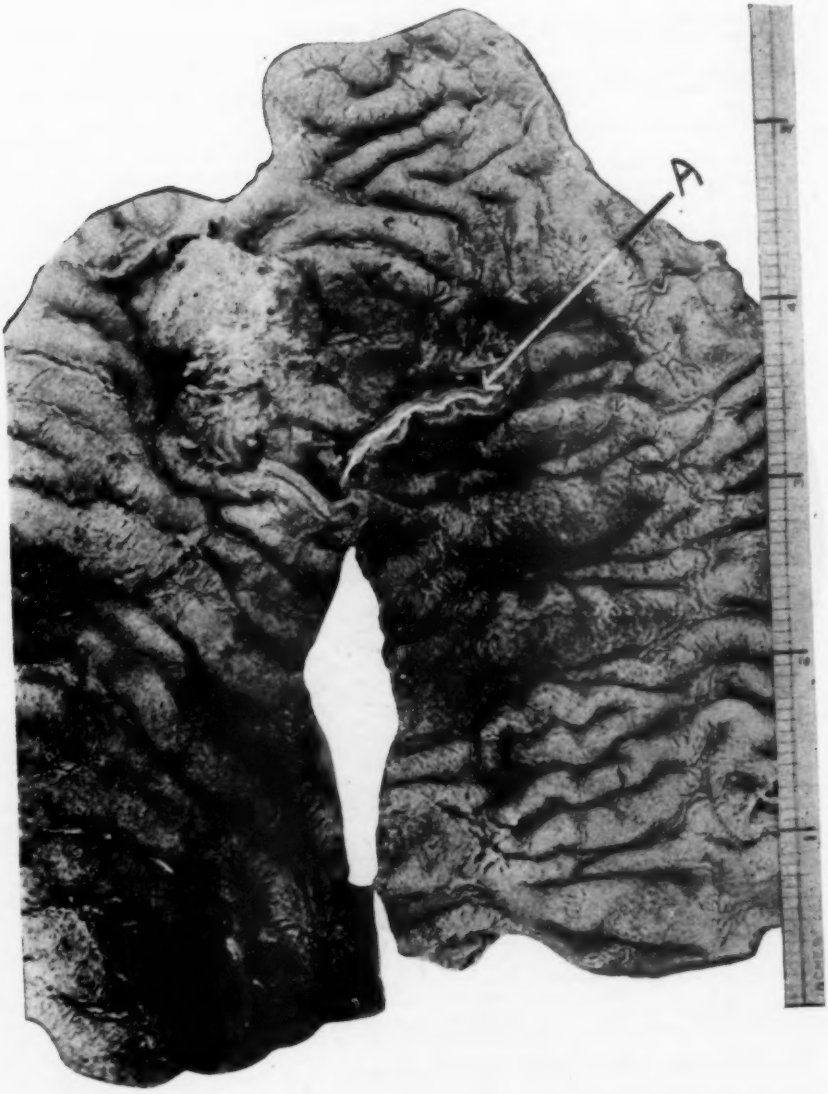


Fig. 2

Fig. 3

Fig. 4

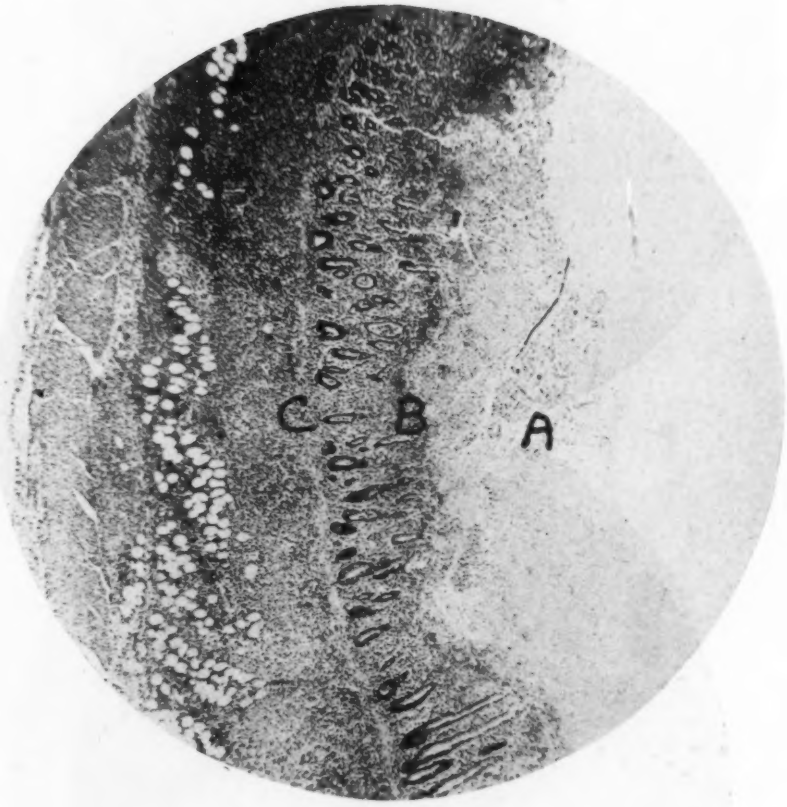


Fig. 5

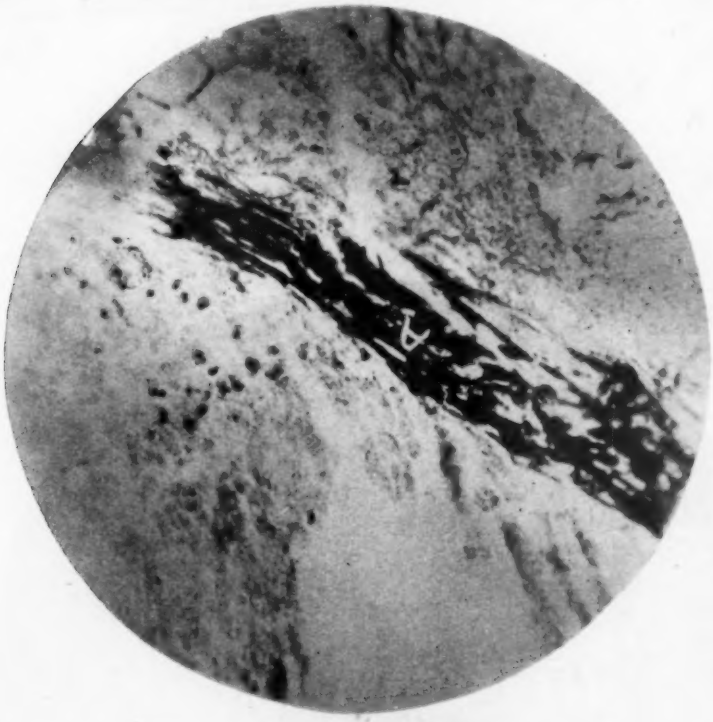


Fig. 7

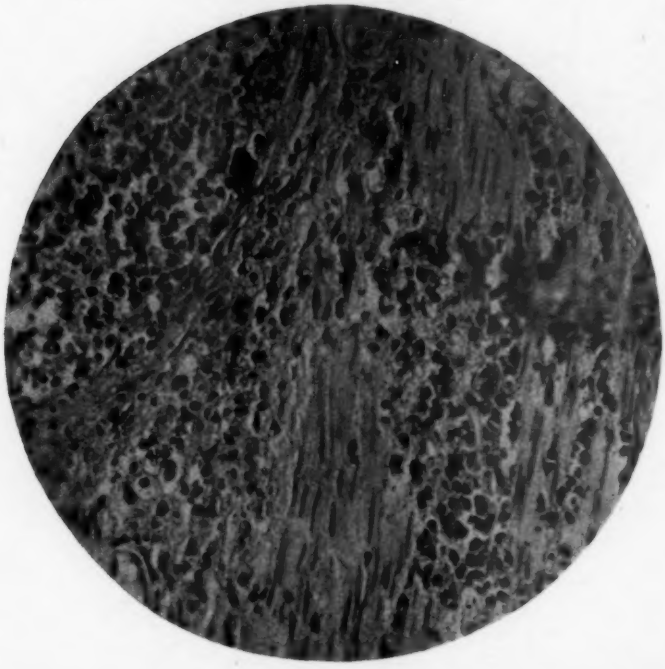


Fig. 6

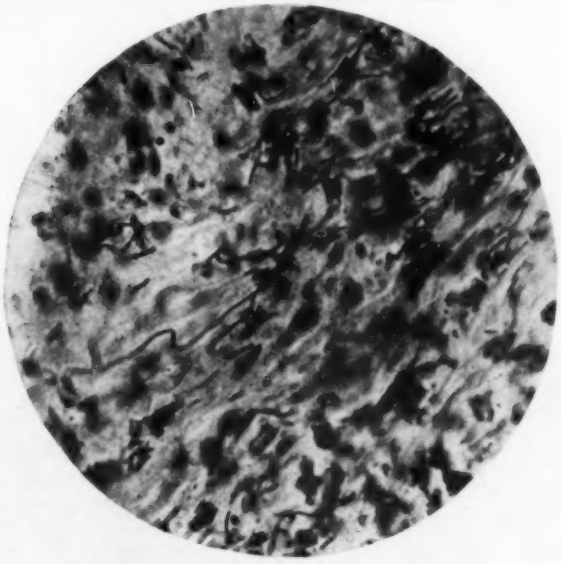


Fig. 9

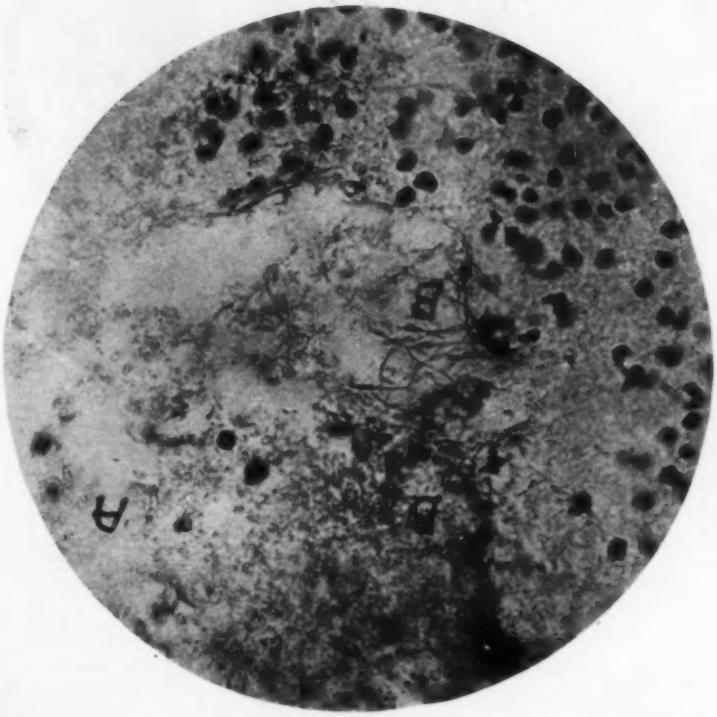


Fig. 8

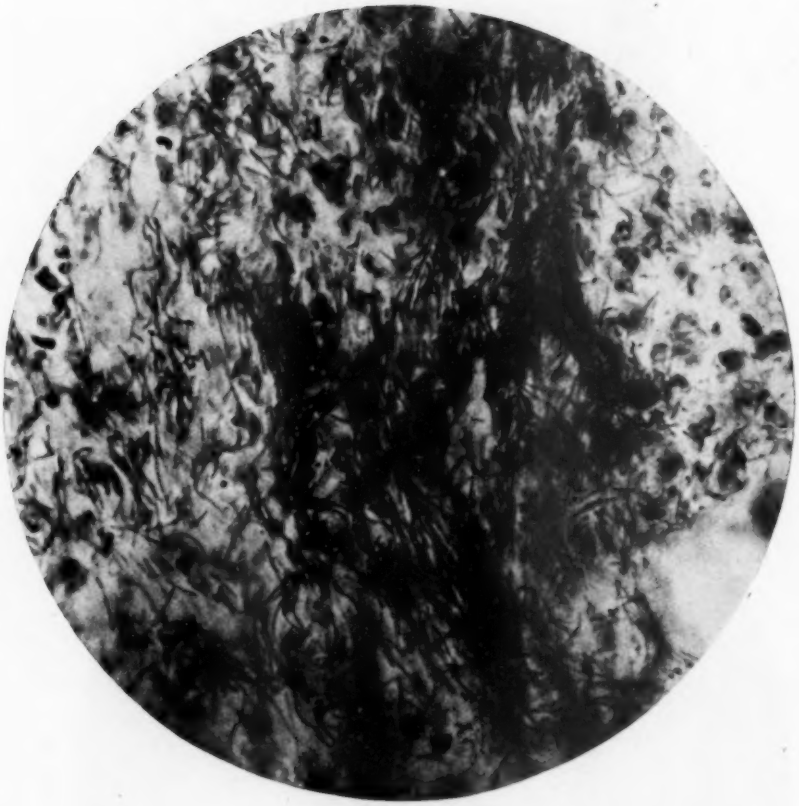


Fig. 10

Fig. 11

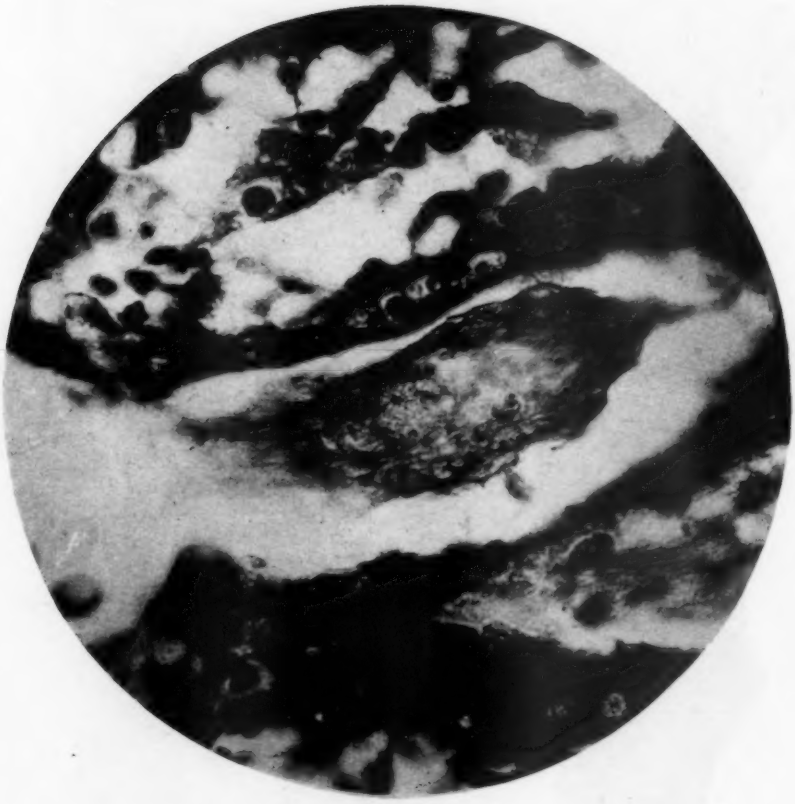


Fig. 12

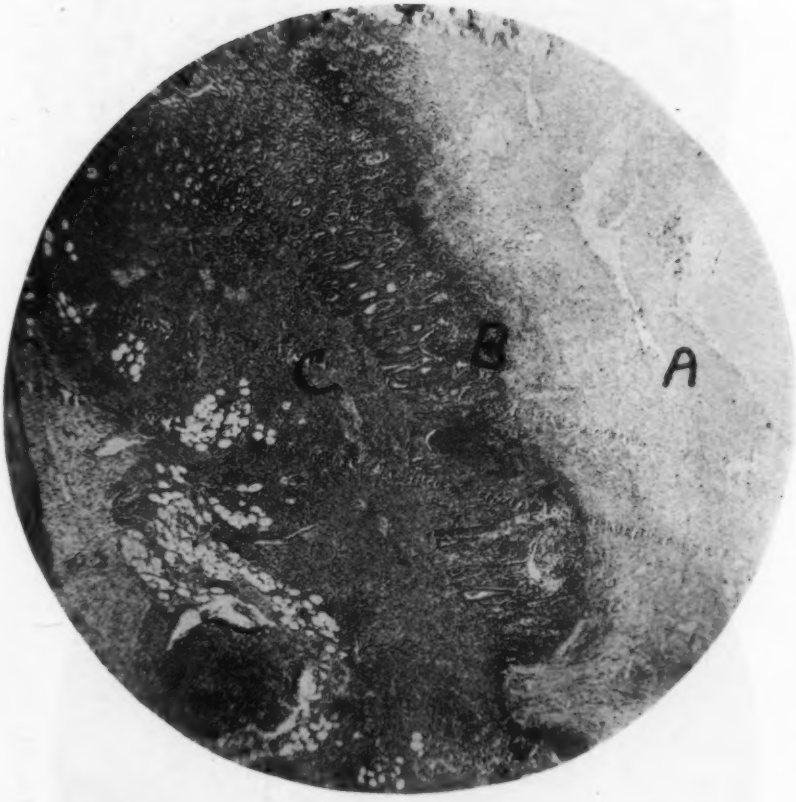


Fig. 13

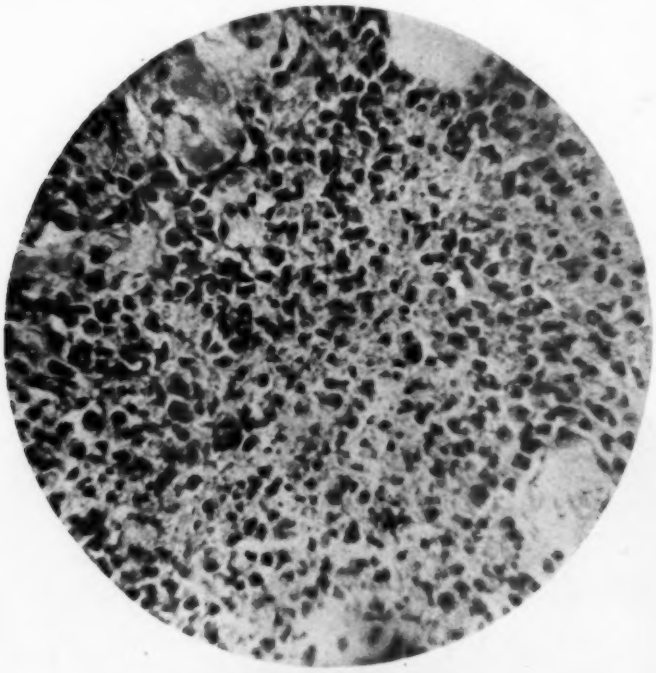


Fig. 15

Fig. 14

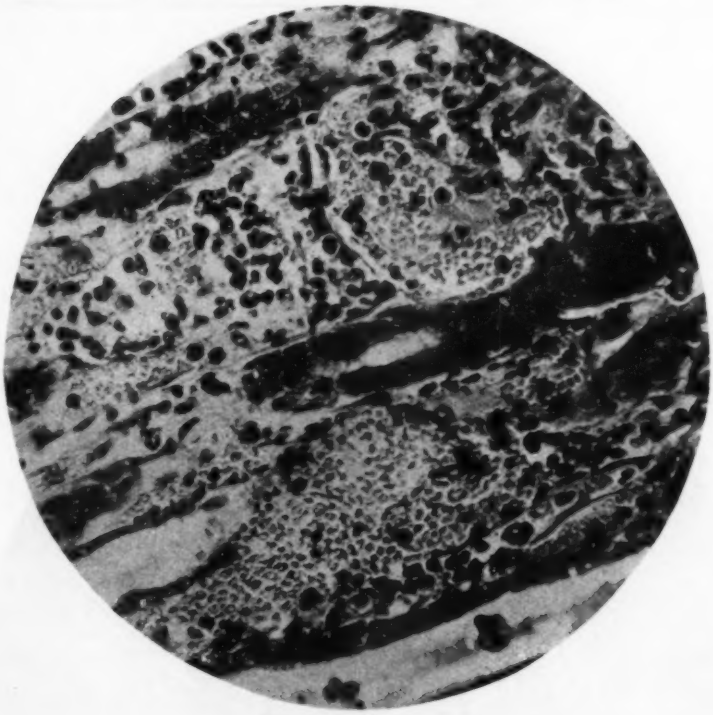


Fig. 17

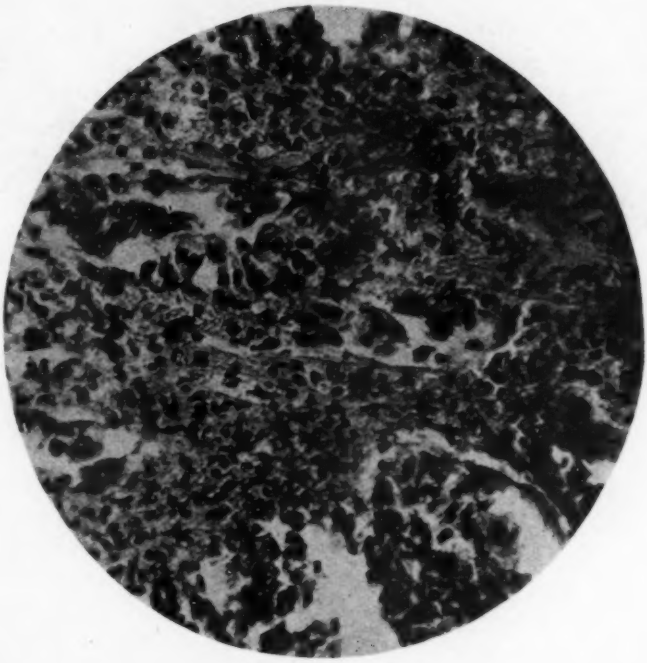


Fig. 16

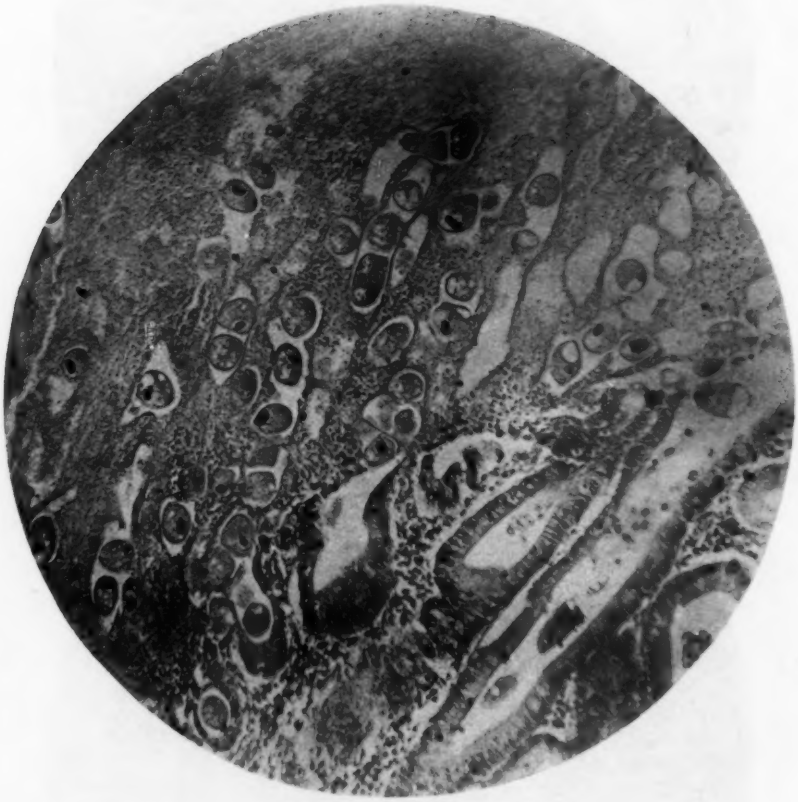


Fig. 18

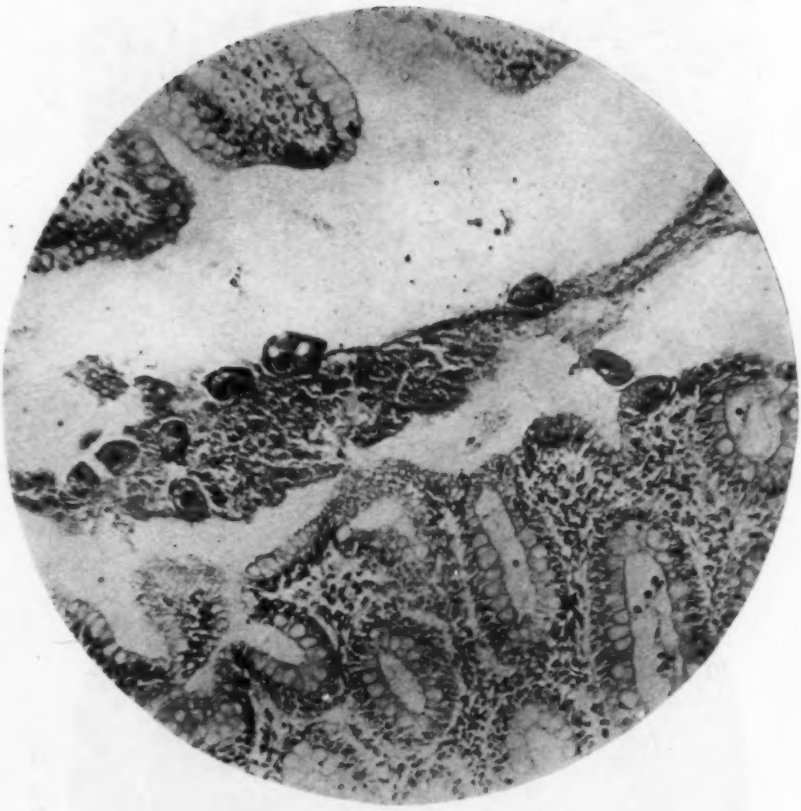


Fig. 19

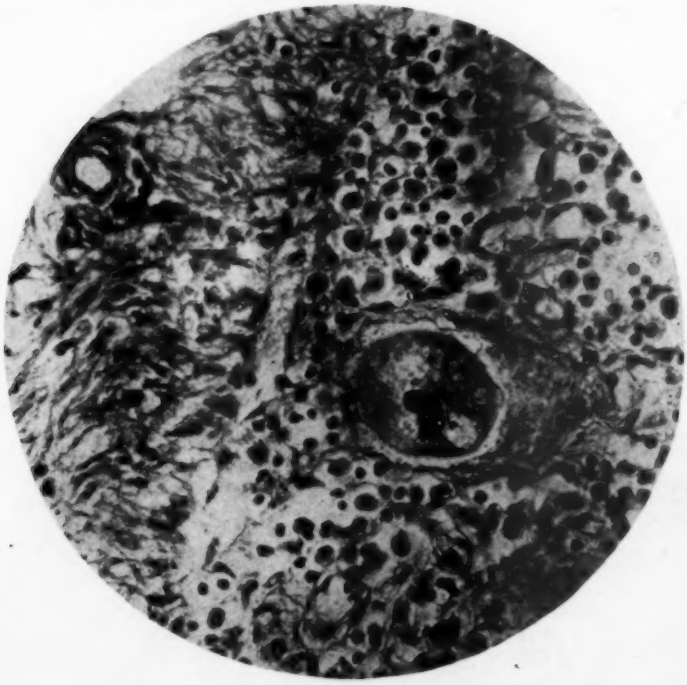


Fig. 21

Fig. 20

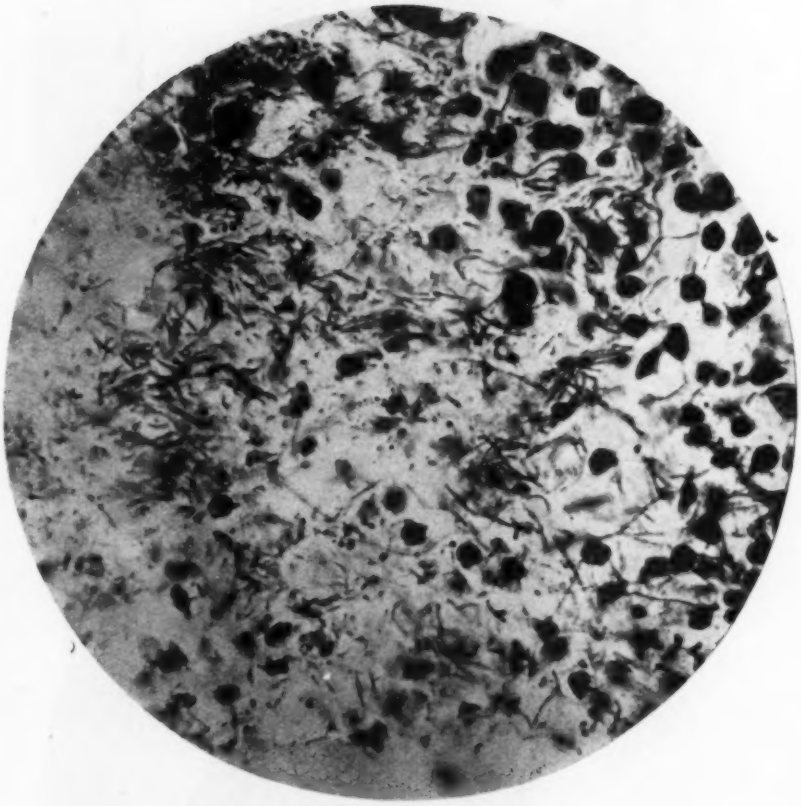


Fig. 22

Fig. 23

Fig. 25

Fig. 24

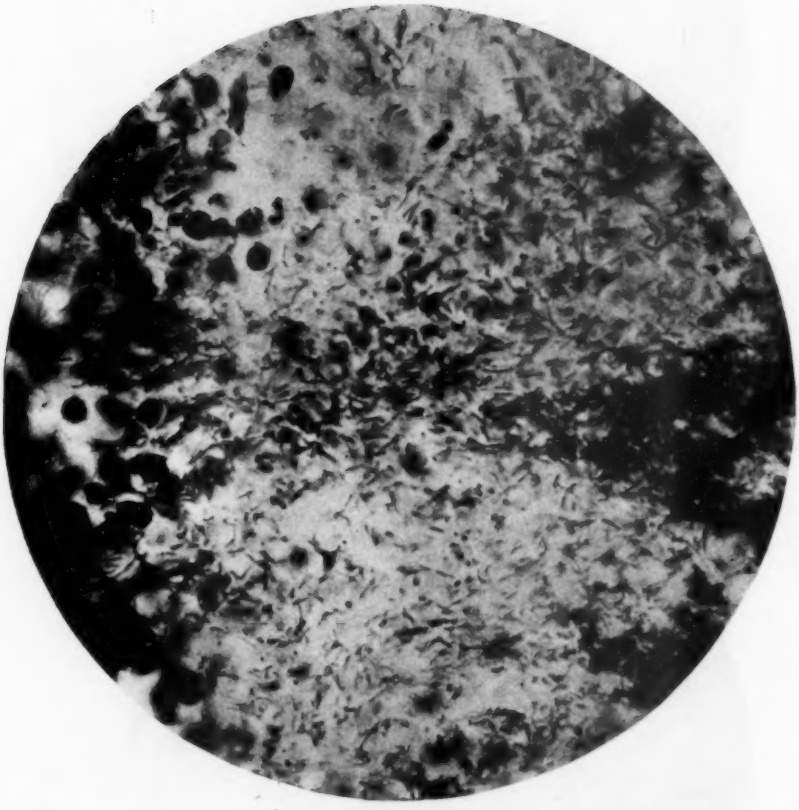


Fig. 26

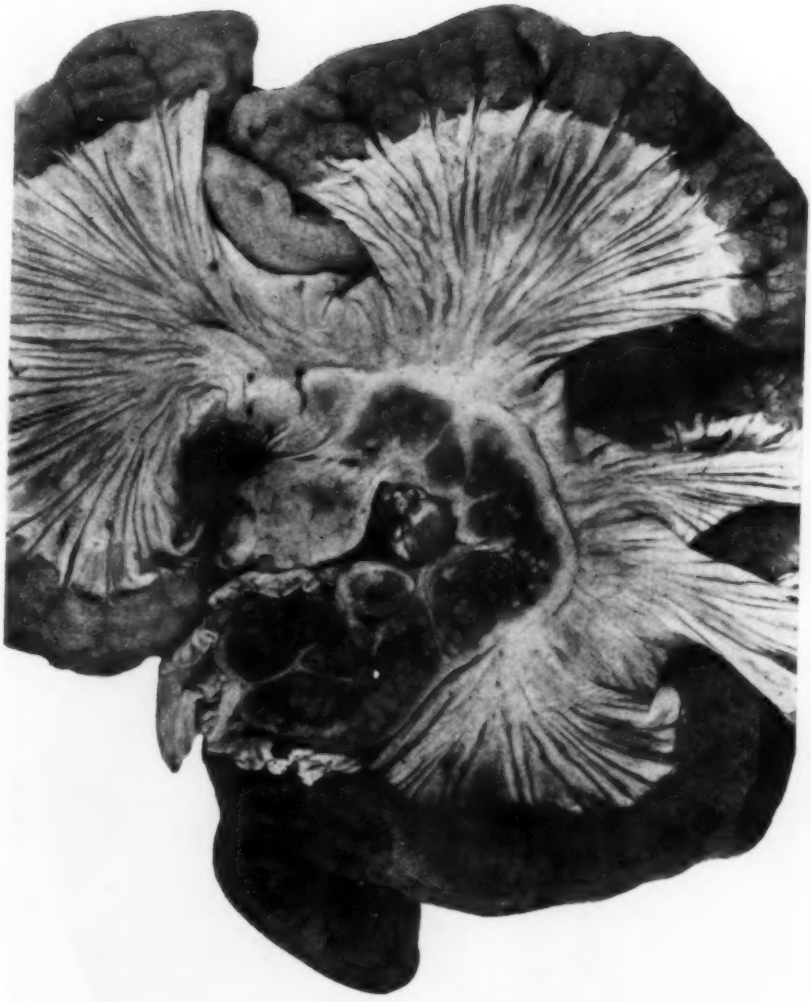


Fig. 27

Fig. 29

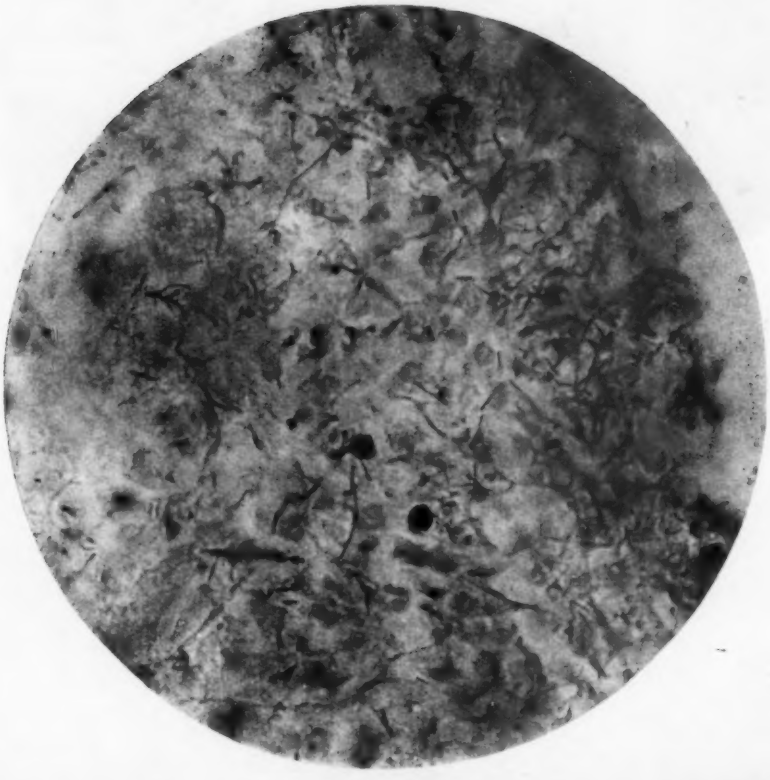


Fig. 28

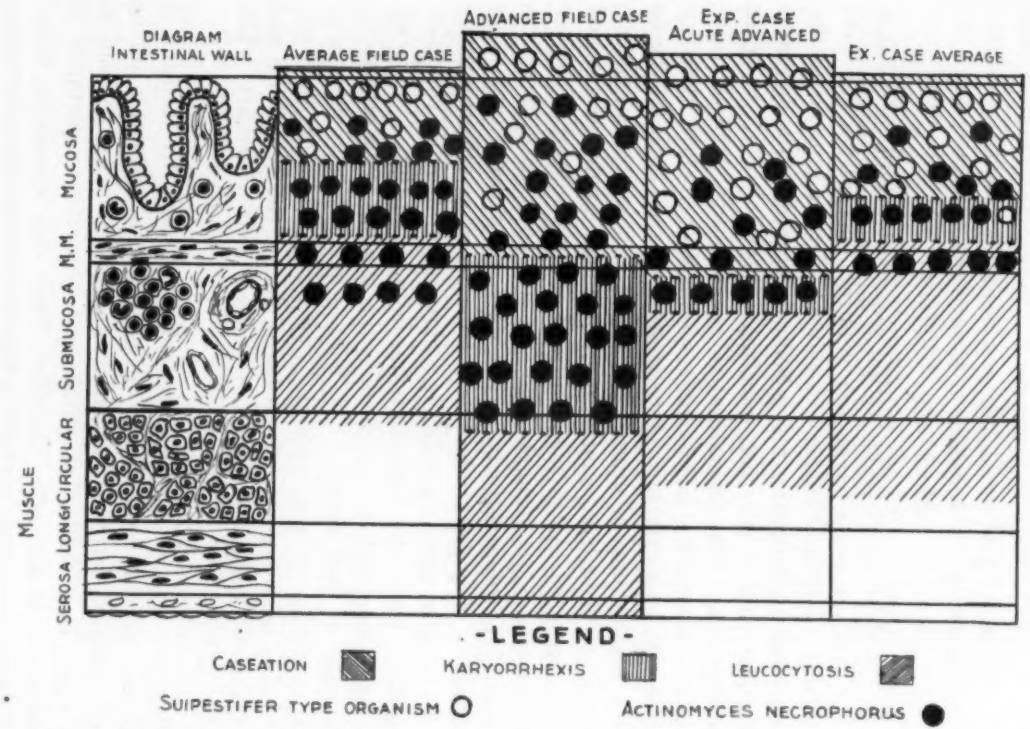


Chart II. Three zones of reaction and their relation in different types of cases and relative distribution of primary and secondary causative agents.

THE EFFECT OF FOWL TYPHOID VACCINATION UPON THE MACROSCOPIC AGGLUTINATION TEST FOR SALMONELLA PULLORUM INFECTION

By R. A. RUNNELLS *and* FRANK THORP, JR.

Department of Zoology and Animal Pathology
Virginia Agricultural Experiment Station
Blacksburg, Virginia

The problem under investigation arose as a result of the fact that in certain sections of the country vaccination for fowl typhoid is being done rather extensively. In the same areas the macroscopic agglutination test is being employed for the diagnosis of bacillary white diarrhea infection of adult fowls. It is an established fact that the causative agent of fowl typhoid (*Salmonella gallinarum*, Klein) and of bacillary white diarrhea (*Salmonella pullorum*) are quite closely related, both belonging to the same group of microörganisms, the colon-typhoid intermediates. They have similar morphological, agglutinative and toxic properties. As to their cultural and fermentative characteristics, they show a marked difference. Their pathogenic role has, until a comparatively recent date, been considered quite dissimilar. *S. pullorum* has been thought of as affecting baby chicks acutely, and as producing a chronic pathological condition in adults. From observations it has been found that *S. pullorum* has been responsible for acute epizootics in adult fowls resembling outbreaks of fowl typhoid. *S. gallinarum* has been associated with epizootics of fowl typhoid. Certain investigators have isolated this microörganism from baby chicks, the symptoms and postmortem lesions of which resembled acute bacillary white diarrhea.

Bacillary white diarrhea, manifesting itself by causing a high mortality rate among baby chicks and the production among adult fowls of "carriers" which eliminate the microörganisms in the eggs, is a disease of paramount economic importance to poultrymen in general. Therefore, from this standpoint many state-wide campaigns are now in operation in an effort to control this infection by eliminating the "carrier" and directly breaking up the cycle of the disease. The presence of *S. pullorum*, local-

Received for publication, June 18, 1927.

ized within the body, stimulates the production of agglutinins, which are essential to the detection of the existing condition by the macroscopic agglutination test. In a similar way a fowl typhoid vaccine, properly prepared from an antigenic strain of the microörganism and injected into a bird, will stimulate the production of agglutinins. Since the two microörganisms under discussion are very closely related, there is a possibility that vaccination by the latter may interfere with the agglutination test for the former. Hence the importance of this problem—to determine the effect of vaccination for fowl typhoid upon the macroscopic agglutination test for bacillary white diarrhea.

Review of Literature

Smith and TenBroeck[1] discuss the relationship between *S. pullorum* and the fowl typhoid bacillus. They state that acid is produced in maltose by *S. gallinarum* but not by *S. pullorum*, and that the latter produces acid and gas in dextrose and mannite, while the former produces only acid. The gas-production of *S. pullorum* is of a fluctuating nature.

Smith and TenBroeck[2], in another publication on the agglutination affinities of the causative agents of fowl typhoid and typhoid of man, state that experiments on rabbits show that fowl typhoid agglutinins are formed and accumulate more slowly than typhoid agglutinins in man.

These authors[3] discuss toxins produced by the fowl typhoid bacillus, and come to the conclusion that they are true endotoxins, since there is only a slight degree of resistance produced by them. This, they state, suggests more of a tolerance than of a true immunity. The injections of minute doses of living bacilli lead to a greater tolerance than when filtrates are injected.

Rettger and Koser[4] made observations on sera obtained from rabbits immunized by injecting heated suspensions of the two microörganisms in question, three times, at five-day intervals. Results showed that there was no difference in agglutinating ability. Injections of living organisms were made in the same manner and there was no difference.

Since the agglutinating properties of the two sera are practically identical, an experiment was run to determine whether either of the two microörganisms was capable of immunizing an animal against the other. It was found that two rabbits, immunized with *S. pullorum* and injected with *S. gallinarum* remained

healthy; the control died. When the opposite was tried, one animal died, the other lost weight and the control died.

Hadley[5] states that there is a close relationship between the antigenic affinity of *S. pullorum* and *S. gallinarum*. S. *pullorum* and *S. gallinarum* exhibit about equal reciprocal agglutinations, but *S. pullorum* serum agglutinates fowl typhoid antigen better than fowl typhoid serum agglutinates *S. pullorum* antigen. The fowl typhoid organism is highly toxic, but decidedly avirulent for the most part.

Gage[6] states that fowls immunized against different types of fowl typhoid microörganisms possess sera which agglutinate *S. pullorum* antigen as well as the homologous antigen. It would appear from this that the test loses some of its specificity, but on the whole, from field and laboratory operations, the test yields valuable results.

In demonstrating interagglutinability, it was found that *S. pullorum* immune serum agglutinated fowl typhoid antigen much better than fowl typhoid serum agglutinated *S. pullorum* antigen.

Kaupp and Dearstyne,[7] in discussing methods of control of fowl typhoid, advise the use of a vaccine, an autogenous vaccine being the best. However, when not available, stock vaccines are used. Either vaccine is used in 1-cc doses for adults and 0.5-cc doses for younger stock.

Edington[8] states that *S. pullorum* A and B and *S. gallinarum* have a similarity in their ability to be agglutinated by sera immune to the respective microörganisms. The immune serum of the one microörganism agglutinates the other microörganism just as well as the homologous microörganism, providing the varying agglutinability of the different microörganisms be allowed for. There is no differentiation by the absorption test.

Bushnell and Patton[9], from field observations with the use of vaccines in roup, cholera and fowl typhoid, state that the deaths following vaccination are only one-fifth of those without vaccination. They state that it is possible to prepare vaccines for certain poultry diseases. However, to be successful, the microörganisms should possess high antigenic properties. No difference was found where a vaccine was rendered sterile by phenol or heat. Where experiments were carried on with *Pasteurella avicida*, they conclude that immunity is probably not more than sixty days, and state that after all the immunity is relative and not absolute. Greater immunity is obtained by large repeated injections.

Kaupp and Dearstyne,[10] in their studies of fowl typhoid, find that the disease in the field usually has a mortality rate of about 30 per cent, but may run as high as 100 per cent. The malady may be controlled through sanitation, isolation of sick and prompt disposal of dead birds, disinfection of drinking water and prophylactic vaccination. Vaccination consisted of a single dose of 2.0 cc of the vaccine to an adult, injected subcutaneously, and 1.0 cc to young stock. The number of microörganisms used was approximately 1,000,000,000 to the cubic centimeter. In the beginning of the work only 1.0 cc was used for an adult fowl and .5 cc for the young stock.

Mathews,[11] in his studies on the agglutination and antigenic properties of *S. pullorum* and *S. gallinarum*, states that there occur non-antigenic strains of *S. pullorum* that play an immaterial part in the control of the disease. Although *S. pullorum* and *S. gallinarum* have similar antigenic properties, their pathogenic properties have been considered unlike, but more recent knowledge shows that *S. gallinarum* in baby chicks may produce pathologic lesions similar to *S. pullorum*. The two microörganisms cannot be differentiated by the agglutination-absorption test. He further states that freshly isolated cultures of *S. pullorum* and *S. gallinarum* can be differentiated by the agglutination test. Hens immunized against the microörganism *S. gallinarum* have sera which agglutinate *S. pullorum* antigen to a much greater dilution than its homologous antigen. He further states that sera from hens immunized with either microörganism contain agglutinins and such sera had titres for *S. pullorum* antigen eight to ten times as great as for *S. gallinarum* antigen. He concludes that *S. gallinarum* antigen can be used for the diagnosis of bacillary white diarrhea infection in mature birds.

Methods of Investigation

Preliminary Testing of Birds

Antigens: During the progress of this problem the sera of the experiment fowls were tested at every bleeding on two different antigens. The antigens used consisted of single strains of *S. pullorum* and *S. gallinarum*. The test fluids were prepared separately but under exactly similar conditions at all times.

Preparation of antigens: The nutrient-agar medium used in growing the microörganisms consisted of the following ingredients: 0.3 per cent beef extract (Difco), 0.5 per cent sodium chlorid (C. P.), 1 per cent peptone (Difco), 2 per cent agar and

distilled water in a sufficient quantity to make the desired amount. The medium was then agitated vigorously with a glass rod and autoclaved at fifteen pounds for two hours. The solution was then titrated and adjusted to pH 7.4 to 7.6 by the "Medalia" method.[12] Then it was reheated at fifteen pounds for 5 to 10 minutes. The medium was removed and strained through a cotton and gauze filter, poured into Buchner tubes, autoclaved at 15 pounds for 30 to 45 minutes, removed, slanted, allowed to cool and inoculated immediately with microörganisms of each culture, transferred with a sterile platinum loop. The cultures were then incubated for 72 hours at 37°C. At the end of that time they were washed from the agar slants with a physiological saline solution containing 0.5 per cent phenol. The bacterial suspension of each Buchner tube was passed through a sterile filter of cotton and gauze into sterile, dark-brown-colored bottles. The antigen was prepared in concentrated form and a sample was taken and diluted to correspond with tube .75 of McFarland's nephelometer and the directions for diluting were placed on the bottles. The bottles were corked, sealed with paraffin and placed in a cold room which had a temperature fluctuating from 10° to 20°C. None of the antigen used was over five weeks old.

Serum: Fifty-seven birds selected from a flock of White Leghorns were chosen for this experiment. Two of the birds died during the course of the project, leaving 55 birds to complete the experiment. These birds were housed in the veterinary hospital until the first week in December. From then on they were placed in three blue-grass yards, 40 feet square, each having a poultry-house of suitable construction. Among the 57 birds selected for this experiment were 17 whose sera were not suitable and could not be used for the vaccination experiment proper. They were housed separately and tested at the same time that the other fowls were. While, in the strict sense of the word, these birds could not be classed as controls, they serve the purpose of determining what the serum titres of birds not vaccinated would be when kept under the same conditions. While in the veterinary hospital, the vaccinated fowls were kept in two pens, males and females in each lot. When put into yards the males were separated from the females.

The birds were leg-banded at the time of the first bleeding. The usual method of obtaining blood from the wing vein at the humero-radial articulation was employed. When serum was

not used on the day the blood was drawn, the samples were kept in the cold room, at an average temperature of 15°C.

Serum-antigen dilution: To determine the agglutinating titre of the serum from the different birds, sterile Wassermann vials were used. The vials were set in racks, one rack to a bird. As the dilutions of serum and antigen used ranged from 1-10 to 1-2560, it required nine tubes of each antigen per bird. Due to the fact that two antigens were used for each fowl, eighteen tubes were required. A control tube for each antigen made a total of twenty tubes per bird.

The undiluted antigen was aspirated from the dark-brown-colored bottles and placed in covered beakers and diluted as previously described, by adding sterile 0.2 per cent phenolated physiological saline solution. The *S. pullorum* antigen was added to one row of tubes and the *S. gallinarum* to the other, by use of sterile 10-cc pipettes. To the first vial was added 0.9 cc and to the other nine, 0.5 cc. A separate sterile 0.1-cc pipette was used to add 0.1 cc of serum to tube 1 of each row. This made a dilution of 1-10 in tube 1. A sterile 1-cc pipette was used for further diluting the serum and antigen by the following procedure: After mixing the contents of tube 1 several times with a pipette, 0.5 cc was removed and placed in tube 2, making a dilution of 1-20. This technic was followed through the remaining tubes. After mixing tube 9, 0.5 cc was discarded. Another sterile pipette was used in diluting the other antigen for the same bird. Each rack was labelled with the leg-band number of the bird and incubated at 37°C. for twenty-four hours, then removed and kept at room temperature for twenty-four hours, at the end of which time the reading was taken and recorded.

The Vaccine and Vaccination

Organism employed: The same strain of *S. gallinarum* was used in the preparation of the vaccine as was used in the preparation of the previously mentioned antigen.

Preparation: The vaccine was prepared as follows: Agar slants were inoculated and incubated at 37°C. for twenty-four hours. The cultures were then washed off with sterile physiological saline solution and the bacterial suspension poured into a sterile Erlenmeyer flask containing glass beads. The flask was shaken for one hour in order to break up the masses of bacteria and liberate endotoxins. The contents of the flask were filtered through a sterile cotton and gauze filter into another Erlenmeyer

flask. The flask and suspension were then heated in a water-bath to a temperature of 60°C. for one hour. At the end of that time trikresol was added in an amount to make a 0.5 per cent solution. The turbidity of the stock vaccine was then determined and directions for diluting it to correspond to tube 3 of McFarland's nephelometer were placed on the container. The vaccine was placed in the cold room at a temperature ranging from 10° to 20°C. A day previous to administration, the vaccine was cultured for sterility, by making a loop inoculation on an agar slant and incubating. None of the vaccine was over five days old at the time of using.

Administration: The stock vaccine, before being used, was diluted so that it corresponded in turbidity to tube 3 of McFarland's nephelometer. When vaccination was to be carried out, the vaccine was aspirated from the container through a 16-gauge needle into a 10-cc glass Luer syringe. The birds were injected subcutaneously with a 2-cc dose, in the loose subcutis ventral to the wing on the left side of the body.

TESTING AFTER VACCINATION

At the beginning of the experiment the blood of all the birds was tested for agglutinins with both *S. pullorum* and *S. gallinarum* antigens. It was found that the sera of the seventeen birds which were unsuitable for the vaccination portion of the experiment gave reactions varying from partial or complete at 1-10, to the same at 1-20 and 1-40. One bird in particular (321), a male, was always complete at 1-40 with both antigens and either partial or complete at 1-80. At one time the serum of this bird was partial at 1-160 with *S. gallinarum* antigen. The remaining sixteen fowls had an agglutinating titre that varied somewhat and toward the close of the experiment many were much lower than when they were started. As was stated previously, these seventeen fowls were housed separately and were tested at the same time as the others. They are designated as group II in this paper.

The remaining birds were used for the experiment proper. When the agglutination test was applied to the sera of these fowls, they were either negative, partial or complete at 1-10. They constitute group I of this project.

These birds were vaccinated five days after the initial test with *S. gallinarum* vaccine. Nine days following vaccination, the sera of the entire flock were tested with *S. pullorum* and *S.*

gallinarum antigens; fourteen days later, a second time; and thirteen days later, a third time.

Five days after the third test, twenty of the previously vaccinated birds were reinoculated with *S. gallinarum* vaccine and again five days later. These twenty birds are designated as subgroup B of group I. Nine days after the last vaccination, the sera of the entire experiment flock were again tested with *S. pullorum* and *S. gallinarum* antigens. This procedure was continued at 14-day intervals until the serum titre of all the 20 vaccinated birds returned to normal. It took a total of five tests at 14-day intervals before this occurred.

TABLE I—*The agglutination reactions of forty fowls (group I, sub-groups A and B) at the initial test and for the three tests after the first vaccination (9-14-26), using S. pullorum and S. gallinarum antigens*

	Tested 9-9-26 Before Vaccination		Tested 9-23-26 After Vaccination		Tested 10-7-26 After Vaccination		Tested 10-20-26 After Vaccination	
Dilution	P	G	P	G	P	G	P	G
1-10	26	24	5	5	23	22	12	21
1-20			12	10	5	7		
1-40			5	8	1			
1-80			8	5		1		
1-160			7	7				
1-320			3	5				
1-640								
1-1280								
1-2560								
Negative	14	16			11	10	28	19

P = *S. pullorum* antigen.
G = *S. gallinarum* antigen.

Results of the Investigation

Effect of the First Vaccination

1. *On the health of the birds:* The vaccination had some effect upon the health of the birds. For three days they consumed only about half the usual amount of grain they had been accustomed to eating, but gradually consumed increasing amounts, until on the fourth day they were back on full feed. The first and second days following vaccination the birds were somewhat inactive and had ruffled feathers. These two symptoms were noticed to become less apparent on the second and disappeared on the third day.

Previous to vaccination, the flock of pullets had been laying an average of four eggs per day, but following the use of the

vaccine they stopped laying for two days and did not lay normally again for six days.

2. *On the agglutinating titre of the serum:* These results are best presented by tables and graphs. The results of the first vaccination appear in table I. In the table, group I (subgroups A and B of the first part of the experiment) refers to all of the birds that were given a single vaccination and were then tested frequently until their agglutination reactions returned approximately to the point at which they stood at the beginning of the problem. The designation, subgroups A and B, is not necessary for an understanding of table I. This subdivision was not made

TABLE II—*The agglutination reactions for group I, sub-group B (vaccinated twice) for the five tests after the second vaccination (10-25-26 and 10-29-26) using S. pullorum and S. gallinarum antigens*

	Tested 11-8-26 After Vaccination		Tested 11-22-26 After Vaccination		Tested 12-6-26 After Vaccination		Tested 12-20-26 After Vaccination		Tested 1-3-27 After Vaccination	
Dilution	P	G	P	G	P	G	P	G	P	G
1-10	3	2	9	5	11	9	9	11	6	11
1-20	7	4	6	8	3	6	2	2		
1-40	3	4	1	2	2	2				
1-80	4	4	1	2						
1-160	1	2		1						
1-320	1		1	1						
1-640	1	3								
1-1280										
1-2560		1								
Negative			1		3	2	8	6	13	8

P = *S. pullorum* antigen.
G = *S. gallinarum* antigen.

until the beginning of the second part of the experiment, when group I was divided so that subgroup B could be given two inoculations of vaccine while subgroup A was left unvaccinated. It is necessary to make this designation from the beginning, however, because the graphic representations of the results are for both parts of the experiment and are most clearly and conveniently presented by subgroups. As stated previously, group II refers to the seventeen birds that were not vaccinated, either in the first or second part of the experiment.

EFFECT OF THE SECOND VACCINATION

1. *On the health of the birds:* Due to the fact that only half of the birds were vaccinated this time and that they were kept

together, it was difficult to ascertain the exact degree of effect vaccination produced as regards appetite, physical appearance and egg-production. There was some loss of egg-production and appetite for a few days, but there was very little change in the physical appearance of the birds.

2. *On the agglutinating titre:* Table II shows fully the effect of two vaccinations upon the serum titres of the fowls. The minimum length of time for the serum titres of some of the fowls to return to normal was twenty-three days after vaccination. The serum titres of some birds returned to normal at the second test, others at the third, still others at the fourth and a few at the

TABLE III—*The agglutination reactions for group I, sub-group A (not vaccinated the second time) for the five tests subsequent to the time of the second vaccination (10-25-26 and 10-29-26) using S. pullorum and S. gallinarum antigens*

	Tested 11-8-26		Tested 11-22-26		Tested 12-6-26		Tested 12-20-26		Tested 1-3-27	
Dilution	P	G	P	G	P	G	P	G	P	G
1-10	3	12	8	12	5	7	6	7	2	5
1-20				1		1				
1-40										
1-80										
1-160										
1-320										
1-640										
1-1280										
1-2560										
Negative	17	8	12	7	15	12	14	13	18	15

P = *S. pullorum* antigen.
G = *S. gallinarum* antigen.

fifth test. The fifth test, which was sixty-five days after the second vaccination, showed that the serum titres of all fowls inoculated had returned to normal. Table III (subgroup A) shows that the serum titres of the once-vaccinated birds remained practically the same throughout the five subsequent tests.

Tables IV and V (group II) show the serum titres of the seventeen fowls that were not vaccinated. Table IV is for the period covered by the first part of the experiment. Table V is for the period covered by the second part of the experiment.

SUMMARY AND DISCUSSION

The effects, following the vaccination of the birds, were manifested in various manners. For three days the fowls consumed

only about one-half the usual amount of grain they had been eating. After that their appetites returned to normal. On the first and second days following the inoculation, the birds were inactive and their feathers were ruffled. Egg-production declined and did not reach normal until the sixth day. These physical disturbances were evidently manifestations of sensitization. According to Kolmer[13] the period of sensitization varies in the different species of animals, depending upon the amount of antigenic material used and the method of administration. The shortest period of incubation observed in guinea-pigs was five days. However, the average was from eight to twenty days.

Table I shows the number of fowls that were negative or positive to the two antigens in the various dilutions used, includ-

TABLE IV—*The agglutination reactions of group II (not vaccinated) during part one of the experiment, using both S. pullorum and S. gallinarum antigens*

	TESTED 9-9-26		TESTED 9-23-26		TESTED 10-7-26		TESTED 10-20-26	
DILUTION	P	G	P	G	P	G	P	G
1-10	6	7	2	5	12	6	5	6
1-20	7	5	12	6	2	9	7	6
1-40	2	3	3	6	1	2	1	2
1-80		1						
1-160								1
1-320								
1-640								
1-1280								
1-2560								
Negative	2	1			2		4	2

P = *S. pullorum* antigen.
G = *S. gallinarum* antigen.

ing the initial test and the three tests after the first vaccination. As shown by the table, some of the fowls were positive at dilutions of 1-10 in the initial test. It is not known whether or not these reactions were due to normal agglutinins. This table shows the following results after the first vaccination: Nine days after vaccination the serum titres of the fowls showed a decided rise, as noted by complete or partial reactions in dilutions varying from 1-10 to 1-320. Twenty-three days after vaccination, the serum titres had dropped and some of the fowls gave no reactions, whereas other birds were positive in dilutions varying from 1-10 to 1-80. Thirty-six days after the first vaccination, the serum titres of all the birds had returned to about where they were before vaccination.

Table IV shows the number of the seventeen unvaccinated fowls that were negative or positive to the two antigens in the various dilutions used in the initial test and the three tests after the time of the first vaccination.

The second vaccination was given with the idea that repeated doses of some vaccines usually, but not always, further increase the agglutinating titre of a serum.[14]

Table II gives the number of fowls that were negative or positive to the two antigens in the various dilutions used after the second vaccination. (Only twenty fowls were vaccinated the second time.) The first test, nine days after vaccination, showed that the birds had positive serum reactions varying from 1-10

TABLE V—*The agglutination reactions of group II (not vaccinated) during part two of the experiment, using both S. pullorum and S. gallinarum antigens*

	Tested 11-8-26		Tested 11-22-26		Tested 12-6-26		Tested 12-20-26		Tested 1-3-27	
Dilution	P	G	P	G	P	G	P	G	P	G
1-10	6	8	8	8	7	8	9	9	8	6
1-20	4	6	4	3	2	2	1	3	1	2
1-40	1	1	1	1	1	1	1	1	1	
1-80										
1-160										
1-320										
1-640										
1-1280										
1-2560										
Negative	6	2	4	5	7	6	6	4	6	8

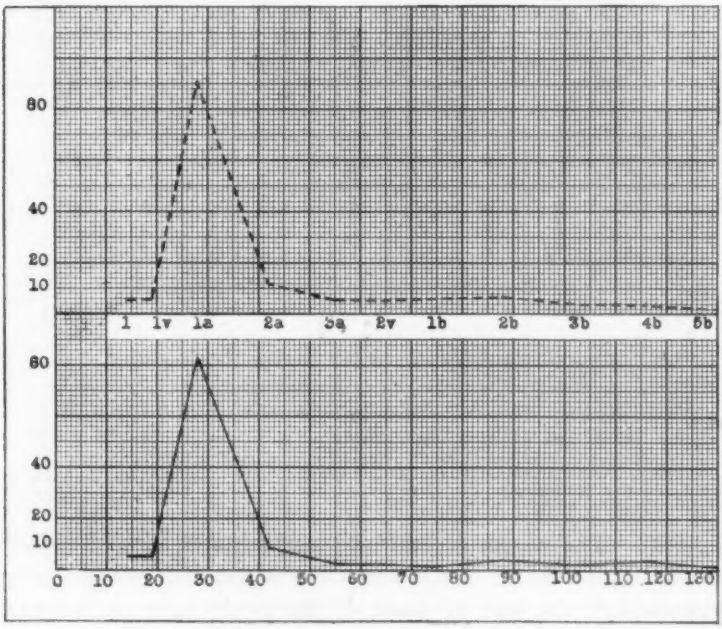
P = *S. pullorum* antigen.
G = *S. gallinarum* antigen.

to 1-640. The serum of one bird agglutinated in a dilution of 1-2560. The second test, twenty-three days after vaccination, showed that the sera of some of the fowls gave no reactions, whereas the sera of other birds were positive in dilutions up to 1-320. The third test, thirty-seven days after vaccination, revealed that the sera of some of the birds were still positive in dilutions up to 1-40. The fourth test, fifty-one days after vaccination, showed that the sera of more of the birds were negative than at any previous test. However, the sera of some fowls gave reactions, complete or partial, in dilutions up to 1-20. The fifth test, sixty-five days after the second vaccination, showed that the titres of the sera had returned to about where they were previous to vaccination.

Table V shows the number of the seventeen unvaccinated fowls that were negative or positive to the two antigens in the various dilutions used in the five tests after the time of the second vaccination.

To make the information presented in the preceding tables more clear, the results of the serum titres are presented in composite graphs.

Graph I shows the effect of one vaccination with fowl typhoid vaccine upon the serum titres of the fowls when *S. pullorum* (curve represented by solid line) and *S. gallinarum* (curve represented by broken line) antigens were used. The figures on the



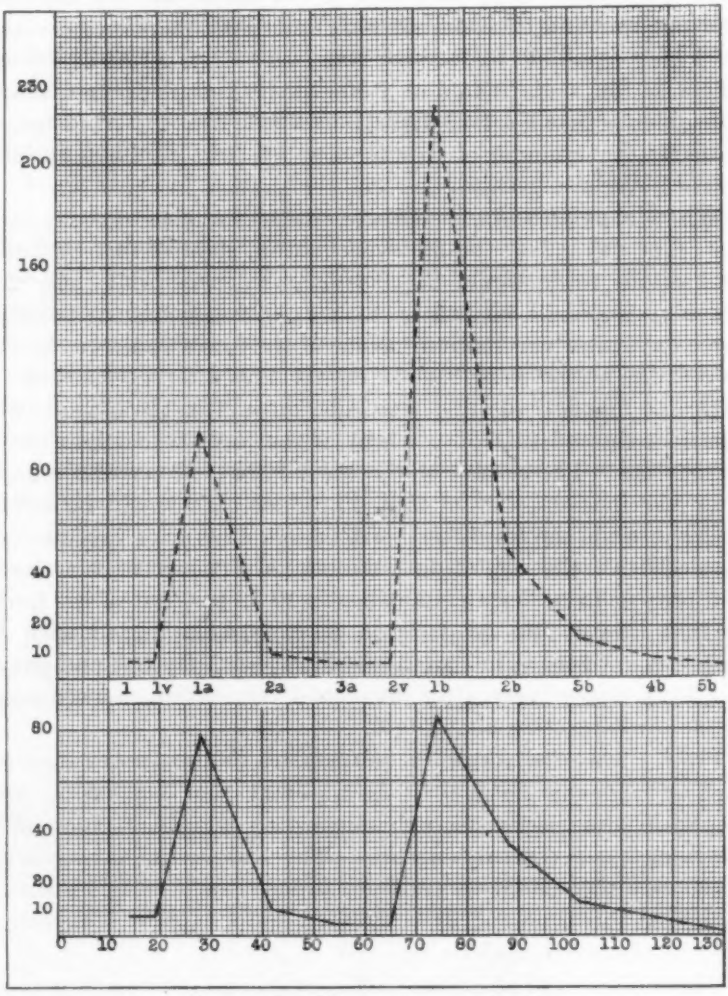
GRAPH I. Effect of one vaccination.

Legend for graphs:

1 —Initial test (9-9-26)
1v—First vaccination (9-14-26)
1a—First test after first vaccination (9-23-26)
2a—Second test after first vaccination (10-7-26)
3a—Third test after first vaccination (10-20-26)
2v—Second vaccination (10-25-26)
1b—First test after second vaccination (11-8-26)
2b—Second test after second vaccination (11-22-26)
3b—Third test after second vaccination (12-6-26)
4b—Fourth test after second vaccination (12-20-26)
5b—Fifth test after second vaccination (1-3-27)

ordinate represent serum-antigen dilutions. The figures on the abscissa represent days.

Graph II shows the effect of two vaccinations (20 fowls vaccinated) with fowl typhoid vaccine upon the serum titres of the fowls when *S. pullorum* and *S. gallinarum* antigens were used.



GRAPH II. Effect of two vaccinations.

All partial reactions are recorded on the graphs as though they were complete.

If the recommendations of the Committee on Poultry Diseases of the United States Live Stock Sanitary Association are adopted

as a basis for determining what constitutes a reaction to the macroscopic agglutination test for bacillary white diarrhea, a fowl is declared a reactor when its serum agglutinates the homologous antigen in a dilution of 1-25.

Due to the fact that this experiment was started before these recommendations were published, a 1-25 serum-antigen dilution was not run and dilutions of 1-20 and 1-40, therefore, are the only ones available for comparison. In this experiment a fowl whose serum agglutinates at 1-40 will be considered a reactor. It is obvious that if a 1-25 dilution had been run with *S. pullorum* antigen, the amount of interference by fowl typhoid vaccine would have been greater.

When expressed in percentage, data compiled on the first test, nine days after the first vaccination, showed that 57.5 per cent of the fowls would be classed as reactors, while only 2.5 per cent would be classed as such at the second test, twenty-three days after vaccination. None of the fowls would be classed as reactors at the third test, thirty-six days after vaccination.

In like manner, the first test, nine days after the second vaccination, showed that 50 per cent of the fowls would be classed as reactors. The results of the second test, twenty-three days after vaccination, showed that 15.78 per cent would be called positive, while the third test, thirty-seven days after vaccination, showed that the agglutinins stimulated by vaccination were still present in sufficient quantities in 10.52 per cent of the fowls so that they would be declared reactors when tested with *S. pullorum* antigen. The fourth and fifth tests, fifty-one and sixty-five days, respectively, after the second vaccination, showed none of the fowls reacting above 1-40.

From the varied results in serum titre of the fowls following each of the vaccinations, it is apparent that something was responsible for the greater and more lasting agglutinin-production following the second inoculation. The body cells, having been previously stimulated to antibody production, were more easily sensitized this time and were therefore more capable of developing and giving off agglutinins.

The ability to produce and retain agglutinins was not permanent in any individual.

In this experiment *S. gallinarum* immune sera agglutinated the homologous antigen in most cases better than the heterologous antigen. This appears to be contrary to the results obtained by some investigators. Also, in the experiment, *S. gallinarum* could

not be differentiated serologically from *S. pullorum* by the agglutination test, using the homologous and the heterologous antigens.

Conclusions

1. A minimum period of nine days and a maximum period of thirty-six days elapses before the serum titres of fowls once inoculated with fowl typhoid vaccine drop to normal.

2. A minimum period of twenty-three days and a maximum period of sixty-five days elapses before the serum titres of fowls inoculated twice return to normal.

3. A second vaccination is responsible for greater and more lasting agglutinin production.

4. Individuals vary in their ability to produce agglutinins.

5. Agglutinin production following vaccination is transitory and not permanent.

6. There is danger of confusion in interpreting the results when testing for bacillary white diarrhea infection by the macroscopic agglutination test after fowl typhoid vaccination.

Other important conclusions arrived at, which do not have a direct bearing on the problem under investigation, are as follow:

1. *S. gallinarum* could not be differentiated serologically from *S. pullorum* by the agglutination test, using both the homologous and heterologous antigens.

2. *S. gallinarum* immune sera agglutinated the homologous antigen in most cases better than the heterologous antigen.

Acknowledgment

Acknowledgment is made of the kindness of Dr. S. H. McNutt, of Iowa State College, in furnishing the culture of *S. gallinarum* for this problem.

References

[1]Smith, T., & TenBroeck, C.: A note on the relation between *B. pullorum* (Rettger) and the fowl typhoid bacillus (Moore). Jour. Med. Res., xxxi (1915), 3, pp. 547-555.

[2]Smith, T., & TenBroeck, C.: Agglutination affinities of a pathogenic bacillus from fowls (fowl typhoid) (*Bacterium sanguinarium* (Moore)) with the typhoid bacillus of man. Jour. Med. Res., xxxi (1915), 3, pp. 503-521.

[3]Smith, T., & TenBroeck, C.: The pathogenic action of the fowl typhoid bacillus with special reference to certain toxins. Jour. Med. Res., xxxi (1915), 3, pp. 523-546.

[4]Rettger, L. F., & Koser, S. A.: A comparative study of *Bacterium pullorum* (Rettger) and Bacterium sanguinarium (Moore). Jour. Med. Res., xxxv (1917), 3, pp. 443-459.

[5]Hadley, Philip B.: The colon-typhoid intermediates as causative agents of disease in birds. R. I. State Coll., Agr. Exp. Sta. Bul. 174 (1918).

[6]Gage, G. E.: Concerning the diagnosis of *Bacterium pullorum* infection in the domestic fowl. Mass. Agr. Exp. Sta. Tech. Bul. 5 (1922).

[7]Kaupp, B. F., & Dearstyne, R. S.: Fowl typhoid. A comparison of various European strains with those of North America. Poultry Sci., iii (1294), 4, pp. 119-127.

[8]Edington, J. W.: The bacteriological study of fowl typhoid and allied infections with special reference to three epidemics. Jour. Path. & Bact., xxvii (1924), 4, pp. 427-437.

[9]Bushnell, L. D., & Patton, J. W.: The use of vaccines in poultry diseases. Poultry Sci., iv (1924-25), 2, pp. 64-73.

[10]Kaupp, B. F., & Dearstyne, R. S.: Fowl typhoid and fowl cholera. N. C. State Coll., Agr. Exp. Sta. Tech. Bul. 27 (1925).

[11]Mathews, F. P.: The agglutinative and antigenic properties of *Salmonella pullora* and *Eberthella sanguinaria*. Jour. A. V. M. A., lxix (1926), n. s. 22 (3), pp. 370-375.

[12]Medalia, Leon S.: "Color standards" for the colorimetric measurement of H-ion concentration pH 1.2 to 9.8. Jour. Bact., v ('920), 5, pp. 441.468.

[13]Kolmer, John A.: Infection, Immunity and Biologic Therapy (W. B. Saunders Co., 1924), p. 618.

[14]Kolmer, John A.: Idem, p. 266.

THE CARD INDEXING OF CURRENT VETERINARY LITERATURE*

By CHARLES H. SEAGRAVES, *Oregon City, Ore.*

It is believed that a card index to current veterinary literature will be found a most helpful supplement to any veterinary library. It will be both edifying to the veterinarian in reviewing each volume as he makes the index, and a substantial guide in his practice, for years to come, when completed.

There perhaps never was a time when our profession was called upon to make use of so wide a scope of current literature. The vast amount of research literature published every month is almost beyond our appreciation. One has just to shut his eyes and let this long procession of animal and bird life, which we are called upon to know about, both in health and disease and, in fact, in every department of learning that pertains to them, pass by, to get a mind's film of the literature that is ours. It comprises a mass of reading matter that few, if any, of us more than touch upon.

Recently our strictly veterinary publications have given space extensively to poultry diseases and to fur-bearing animals—subjects that should engage any practitioner's interest, no matter how much he may specialize, because it has a bearing upon his status in the broad field that is the veterinarian's. Oh, at times how we wish for the help of an article we faintly recall having read. Yes, we read these valuable articles in the journals—that much we remember—but to have them available for use is unfortunately not the rule. We must depend upon our current literature if we hope to keep up to date.

The natural tendency, when we have a problem of diagnosis or treatment and no ready information to help us, is to call upon our ingenuity. Of course we always, to a certain degree, resort to personal reasoning in handling our difficulties, but the awful pitfall for us is to try to get along too much without authoritative guidance; to keep substituting personal ideas and methods until our batting average is beyond redemption. We shall continue to do this very thing unless we can arrange our current literature, research and experiment station reports so as to have them available.

*Presented at the annual meeting of the Northwestern Veterinary Medical Association, Bellingham, Washington, June 27-29, 1927.

The few foregoing sentences are a confession of how things were going with myself, while I depended upon text-books and what I could and could not recall from journal articles read months before. Rather than go to the trouble of searching through the separate indices of fifteen or twenty volumes, to get information on some new and perplexing condition, I would take a long shot at treating the patient by the inductive method. In prevailing upon you to have your current literature bound and then go through each volume and cross-index the articles so that the item can be found under several headings, if necessary, it is with the belief that you will be greatly rewarded.

This will be a super-index, covering the subject matter of all your journals. At a moment's demand you may simply pull out your desk drawer and, behold! On a card therein will be the volume, page and author, or perhaps the subject you want, written by a dozen authors. For years back there is instantly available, information of untold worth to you.

There may be more efficient ways of indexing than I will describe, but this is practical. I selected standard 3x5 filing cards, of thin material, to facilitate typing. One can index directly from the volume index, turning to each article for the author's name and a casual study of the subject, and noting whether one wants to cross-index for other information. Perhaps technic or statistics, for example, might not easily be found again. One must be specific and segregate closely if the index is to be a conveniently working one. For instance, take the article, "Contagious Bovine Abortion." Your card would read: "Abortion, Contagious Bovine," with such sub-headings as Agglutination Test, Bacillus, Control, etc. One can see that many cards are required.

ABORTION (SWINE)

Infectious abortion of swine. L. P. Doyle and R. S. Spray. Jour. Inf. Dis., xxvii (1920), pp. 165-168. Abst. in Jour. A. V. M. A., lviii (1920), n. s. 11 (1), pp. 99-100.

Infectious abortion in swine. M. Schlegel. Zeit. f. Infek. d. Haust., xix (1918), p. 332. Abst. in Jour. A. V. M. A., lviii (1920), n. s. 11 (2), p. 206.

Some studies in swine abortion. Fred Hayes. Jour. A. V. M. A. lx (1922), n. s. 13 (4), pp. 435-452.

In conclusion, I believe that in reviewing your literature in the course of making this index you will be fully rewarded and its availability for consultation will give you greater confidence in your practice.

CLINICAL AND CASE REPORTS

(Practitioners and others are invited to contribute to this department reports of unusual and interesting cases which may be helpful to others in the profession.)

UNUSUAL CASES OF TUBERCULOSIS

By CHARLES A. MITCHELL, *Ottawa, Canada.*

Pathological Division, Health of Animals Branch, Department of Agriculture

Owing to the present importance attached to determining the susceptibility of animals to different specific types and mixed types of tuberculosis, such cases as the following seem worthy of being placed on record.

CASE 130

Tuberculous infection in sheep is exceedingly rare, as was pointed out by Van Es.[1]

A specimen, consisting of a portion of a prescapular lymph-gland, which had been removed from a sheep by one of the inspectors of the Meat Inspection Service, was received at the laboratory. The following information accompanied the specimen.

> Specimen taken from a sheep: retropharyngeal gland, enlarged and caseous; prescapular gland, caseous; other glands and organs, normal; carcass, emaciated.

Acid-fast organisms could not be found in stained smear preparations. Since the lesion was tuberculous in appearance, a guinea pig was inoculated from it. On the 36th day the guinea pig died, and on postmortem examination showed typical lesions of tuberculosis, in the spleen, liver and some of the lymphatic glands. Acid-fast organisms were found in the lesions and successful plants from the spleen were made upon digested egg medium.* The biological characteristics of the organism were suggestive of the bovine type of tubercle bacillus, and this was confirmed by its proven pathogenicity for guinea pigs and rabbits.

*This medium is prepared in the following manner: Break several eggs into a flask containing heavy glass beads and add 30 per cent sterile equine or bovine serum. Shake to break up the eggs. Neutralize. Then add a sufficient quantity of pepsin and sufficient hydrochloric acid to bring the reaction within the digestion range of this acid (.2–.4%). Heat for four hours at 37°C., agitating the mixutre occasionally, and strain through cheesecloth. Neutralize with normal sodium hydroxid solution. Tube, slant and inspissate at 73°C. for four hours, for three successive days. This medium is greenish yellow in color, and almost transparent. We have found it excellent for isolating tubercle bacilli.

CASE 9347

This occurred in an accredited herd of cattle with record of tuberculin testing as follows:

Date Tested	*Number Tested*	*Reactors*
June 29, 1922	53	40
Dec. 18, 1922	36	3
March 22, 1923	44	6
June 5, 1923	47	1
Sept. 10, 1923	51	0
March 17, 1924	61	0
Sept. 23, 1924	60	1
Jan. 21, 1925	65	0
July 27, 1925	59	0
Feb. 1, 1926	61	0
Feb. 3, 1927	71	0

All additions were tested.

Animal affected: In June, 1927, one of the non-reacting animals that appeared in good health and had passed the test in February became extremely weak and unable to rise. After remaining in this condition a few days, the owner decided to kill her. This was done and a postmortem examination held by a veterinary inspector.

This examination revealed lesions in the mesenteric lymph-glands. These were enormously enlarged, some about the size of a base ball. All other tissues appeared normal. The condition was thought to be actinomycosis.

Laboratory examination: The gland received at the laboratory was very much enlarged and spongy. No evidence of caseation or calcification was noted. Stained smear preparations showed the presence of an enormous number of acid-fast organisms. These organisms in appearance were long, but did not appear beaded.

Laboratory animals inoculated: Guinea pig 717 was inoculated intraperitoneally with a small piece of gland teased out in broth. This animal died on the 24th day and presented tuberculous lesions of spleen, peritoneum and mesenteric gland.

Guinea pigs 730-31 were inoculated from 717. After an incubation period of four weeks, these animals were tested with the intradermal tuberculin test (avian tuberculin left side of abdomen, bovine on the right). Both animals gave a pronounced reaction to avian tuberculin and a slight reaction to bovine tuberculin.

Rabbit 715 was inoculated subcutaneously with a piece of the gland. After six weeks the rabbit was killed and only a very small local lesion was found at point of inoculation.

Chicken 716 was inoculated intraperitoneally from the gland. About two weeks after inoculation, the chicken commenced to

appear unwell and gradually failed until, on the 43rd day, it was found in comatose condition. It was killed. Autopsy showed the liver affected, the lesions being miliary in nature. The peritoneum presented several tubercles. Acid-fast organisms were found in the affected tissues. A comparison of these organisms with those found in the guinea pig and rabbit did not indicate any difference in morphological structure.

Cultures: Successful plants were made from animal 717. The organism appears to date to resemble the avian type, in its growth and character upon culture media.

This case would seem to be an exceptionally interesting one owing to the fact that the strain of tubercle bacilli affects guinea pigs and chickens, and that the guinea pigs react to avian tuberculin, which indicates the affection was caused by either a mixed or intermediate type of organism.

REFERENCE

[1]Van Es, L.: Avian tuberculosis infection in mammals other than swine. Jour. A. V. M. A. lxx (1927), n. s. 23 (6), pp. 775-780.

VITAMIN D AND FISH

Exposure to ultraviolet rays, which has been shown in the case of cows to increase the vitamin-D content in dairy products, does not work with fish, according to Charles E. Bills, research chemist, of Evansville, Ind. Fish subjected to five-minute exposures of ultraviolet irradiation every other day for six weeks produced oil that displayed no more potency than that made from fish which had not been so treated. During the period in which the Newfoundland codfish fattens, it gorges itself on small fish known as caplin, which contain only a small amount of vitamin D. To account for the unusually high potency of cod-liver oil the cod would have to consume, within a period of four weeks, about 26 times its weight of caplin, a most unlikely quantity. The presence of vitamin D in the liver of fish consequently is judged to be the result of chemical reactions in the body of the fish at present not clearly understood.

—*Science.*

One on the Druggist

"What did you put in this prescription?"

"That I can tell only to the doctor," said the druggist.

"The doctor wants to know. Seems I gave you a Chinese laundry ticket and you filled that."—*North American Union.*

REVIEW

HISTORY OF THE ROYAL ARMY VETERINARY CORPS, 1796 TO 1919. Major-General Sir Frederick Smith, K. C. G. M., C. B., formerly Director-General of the Army Veterinary Service, Fellow and Honorable Associate of the Royal College of Veterinary Surgeons. xii+268 pages with 14 full-page halftones and 10 colored plates. Ballière, Tindall and Cox, London, 1927. Cloth, octavo, 21/—net.

This is an exceptionally well-written book. The cover is ornamented with the badge of the Corps and the book is well illustrated with cuts of many well-known officers who were connected with the growth and development of the Corps. Cuts in colors show the styles of uniforms worn in the different periods.

Major-General Smith's writings are not new to English-speaking veterinarians. He is a writer of merit and is well known professionally. It is fortunate that a man so well trained in military and professional matters should write the history of the Corps.

The history is divided into four periods, as follows: 1600 to 1796, that of the farriers; 1796 to 1839, the genesis of the Veterinary Corps; 1839 to 1876, the assumption of a military character; and 1876 to 1919, the evolution of the veterinary service.

This history, combined with the excellent history of the Royal Army Veterinary Corps during the Great War, which was published last year, make an interesting and instructive story of the best army veterinary service of all time. Growth was slow but sure, and authority, at all times, was grudgingly given. The author has well expressed the growth of the Corps by saying that each generation has stood on the shoulders of its predecessor. Our British confrères had the same difficulties to overcome that were so apparent in our army service, but by pluck, courage, and ability, they were able to complete their job in time to be useful in the Great War.

The history must be read to be appreciated. It was written after many years of research and published through the generosity of the committee of the Royal Army Veterinary Corps Officers' Fund and the author has turned over to this fund the copyright of the book.

C. J. M.

PUBLICATIONS RECEIVED

Puerto Rico, Informe Anual del Director de la Estacion Experimental Insular del Departmento de Agricultura y Trabajo de, Ano Fiscal 1925-1926. San Juan, P. R., 1927. pp. 62.

Connecticut, Biennial Report of the Commissioner on Domestic Animals for the period ended June 30, 1926, State of. Hartford, Conn. pp. 35. Illustrated.

National Research Council for the year July 1, 1925-June 30, 1926, Report of the. Washington, D. C., 1927. pp. 106.

Rockefeller Foundation. A Review for 1926. George E. Vincent. New York, N. Y., 1927. pp. 54. Illustrated.

Southern Rhodesia, Report of the Director of Veterinary Research for the year 1926. Salisbury, Rhodesia, 1927. pp. 11.

Operation of a Four Unit Farm Poultry Plant. B. F. Kaupp. (Bul. 251, Agr. Exp. Sta., N. C. State Coll. of Agr. & Eng., Raleigh, N. C., February, 1927. pp. 28. Illustrated.)

A Brief Sketch of the U. S. Bureau of Animal Industry and Its Functions. T. P. White. U. S. Dept. of Agr., Bureau of Animal Industry, Washington, D. C., 1927. pp. 14.

Bacillary White Diarrhea. B. F. Kaupp and R. S. Dearstyne. (Tech. Bul. 29, Agr. Exp. Sta., N. C. State Coll. of Agr. & Eng., Raleigh, N. C., June, 1927. pp. 47. Illustrated.)

Montréal, Annuaire de L'Ecole de Médicine Vétérinaire, Année Académique (1927-1928), Université de. Montréal, Que. pp. 51.

Fowl Typhoid and Fowl Cholera. B. F. Kaupp and R. S. Dearstyne. (Tech. Bul. 27, Agr. Exp. Sta., N. C. State Coll. Agr. & Eng., Raleigh, N. C., July, 1926. pp. 83. Illustrated.)

Alabama Polytechnic Institute, College of Veterinary Medicine, Announcements for 1927-1928. Auburn, Ala., July, 1927. pp. 24.

Muktesar, for the year ending March 31, 1926, Annual Report of the Imperial Institute of Veterinary Research. Calcutta, India, 1927. pp. 18.

Collected Studies on Hog Cholera. L. M. Roderick and A. F. Schalk. (Bul. 210, Agr. Exp. Sta., N. D. Agr. Coll., Fargo, N. D., April, 1927. pp. 24.)

Johne's Disease. Infectious Diarrhea of Cattle. Harry Morris. (Bul. 200, Louisiana State Univ. & Agr. & Mech. Coll., Agr. Exp. Sta., Baton Rouge, La., June, 1927. pp. 8. Illustrated.)

The Blood and Urine of the Cow in Milk Fever. C. E. Hayden and L. B. Sholl. Reprint from 1924 Annual Report of the N. Y. State Vet. Coll., Cornell Univ., Ithaca, N. Y. pp. 91-101.

The Blood and Urine of the Cow in Milk Fever. (Second report.) C. E. Hayden. Reprint from the 1925 Annual Report of the N. Y. State Vet. Coll., Cornell Univ., Ithaca, N. Y. pp. 200-205.

The Blood Sugar of the Cow in Milk Fever. C. E. Hayden, Ithaca, N. Y. Reprint from *Corn. Vet.*, xvii (1927), 2, pp. 121-131.

The Physiology of Milk Fever. Pierre A. Fish, Ithaca, N. Y. Reprint from *Corn. Vet.*, xvii (1927), 2, pp. 99-120.

The Green Coloration by Certain Streptococci on Blood Agar. William A. Hagan, Ithaca, N. Y. Reprint from *Jour. Inf. Dis.* xxxvii (1925), 1, pp. 1-12.

Bracken Poisoning of Cattle. W. A. Hagan, Ithaca, N. Y. Reprint from *Corn. Vet.*, xv (1925), 3, pp. 326-332.

The Value of Placental Examination for the Diagnosis of Infectious Abortion of Cattle. W. A. Hagan, Ithaca, N. Y. Reprint from Annual Rept. of the N. Y. State Veterinary College, 1926. pp. 125-130.

The So-Called Stiff Lambs. H. J. Metzger and W. A. Hagan, Ithaca, N. Y. Reprint from *Corn. Vet.*, xvii (1927), 1, pp. 35-44.

ARMY VETERINARY SERVICE

CHANGES RELATIVE TO VETERINARY OFFICERS

Regular Army

Captain James L. Barringer, V. C., is assigned, in addition to his other duties at the Reno quartermaster depot (remount), Fort Reno, Okla., to the remount purchasing and breeding headquarters, Fort Reno.

Major Clell B. Perkins, V. C., is relieved from further assignment to additional duty at the remount purchasing and breeding headquarters, Lexington, Ky.

Reserve Corps

New Acceptances

Darby, Howard Lee	Major	411 Neil Anderson Bldg., Ft. Worth, Tex.
Wetter, Charles Herbert	1st Lt	Princeton, Minn.

Separation

LaFrance, John	2nd Lt	Failed to accept reappointment.

Promotion

Clarvoe, Harold McKenney	Captain	50th Street & 7th Avenue, Route 3, Box 165 K, Tampa, Fla.

GREATEST BOON TO HOGS

Exactly as printed, we quote from the program of the forty-fifth semi-annual meeting of the Illinois State Veterinary Medical Association, held at Bloomington, Illinois, July 20-21, 1927, as follows:

> 6:30 p. m.—Banquet at Maplewood Country Club. Celebrating the achievement of "The McLean County System of Hog Sanitation," the greatest boon to the swine industry. Speaker of the evening, Dr. Maurice C. Hall, Chief of Zoological Division, Bureau of Animal Industry.

Surely hog producers must congratulate veterinarians on a platform which places sanitation first among the great boons to their industry. The average layman would guess veterinarians would think that a lot of serums and pills and treatments for diseases with long scientific names should come up for discussion at one of their state wide meetings. Instead, here is a large group of men trained in the treatment of diseases of live stock, meeting in one of our largest live stock producing states, celebrating the prevention of disease through sanitation. Prevention, too, which does not require the services of the veterinarian, but which can be accomplished with such common things as soap suds and lye water, scrub brushes and clean pastures.

Veterinarians with such a vision of their profession are an asset in every live stock community.—*National Live Stock Producer.*

BIBLIOGRAPHY ON BOVINE INFECTIOUS ABORTION FOR 1926

There is a well-sustained interest in the problem of bovine infectious abortion, if one may use as a criterion the number of papers published on the subject during the year 1926. The quality of the research and observations is also not lacking. There is added to the interest on the part of the veterinary pathologist and practitioner an increasing concern on the part of the student of human medicine. The relationship of Bang's disease to Bruce's disease (Malta fever) bids fair to attract its full share of scientific and clinical attention during the next few years. The perfection of methods of diagnosis and of vaccine treatment is not being neglected.

Michigan State College, WARD GILTNER.
East Lansing, Michigan.

Amer. Med. Asso., Journal of
1926—Malta fever. Jour. Amer. Med. Asso., lxxxvii (14), p. 1140.

A. V. M. A., Journal of
1926—Report of Committee on Abortion. Jour. A. V. M. A., lxx, n. s. 23 (1), pp. 102-103.

Andrei, G.
1926—Alcuni raporti di affinita fra il micrococco melitense e il bacillo di Bang. (Some reports on the relationship between the *Micorcoccus melitensis* and the Bang bacillus.) Giorn. di Batter. e Immunol., i (3), March. Abst. in Bul. de l'Inst. Past., xxiv, p. 832.

Arkansas Agr. Exp. Sta.
1926—Anti-abortion vaccines. Ark. Agr. Exp. Sta. Bul. 203, pp. 31-32. Abst. in Exp. Sta. Rec., lv, p. 72.
1926—Anti-abortion vaccines. Ark. Agr. Exp. Sta. Bul. 215, pp. 37-38. Abst. in Exp. Sta. Rec., lvi, p. 377.

Barnes, M. F.
1926—Bovine abortion—Prevention and control—Further remarks. Jour. A. V. M. A., lxviii, n. s. 21 (4), pp. 429-442.

Beguet.
1926—Mechanism of agglutination (apropos *Br. melitensis*). Compt. Rend. Acad. Sci., clxxxiii, pp. 323-325. Abst. in Chem. Abst., xx, p. 3308.

Bergman, Arvid M., & Argen, E.
1926—Vaccinationsförsök mot smittsam kastning hos nötkreatur I sverige. (Experiments with vaccination against infectious abortion in cattle in Sweden.) Meddelanden från Statens Veterinärbakteriologiska anstalt, xx.

Bevan, L. E. W.
1925—The abortoscope: A simple apparatus for the detection of infectious abortion in cattle. Vet. Jour., lxxxi (10), p. 476. Abst. in Trop. Vet. Bul. 14 (1926), p. 25. Abst. in Exp. Sta. Rec., lv (1926), p. 72.

Birch, R. R.
1926—Technique of drawing blood samples from cattle for the agglutination test. Corn. Vet., xvi (2), p. 153.

Birch, R. R., & Gilman, H. L.
1926—The agglutination test as an aid in handling abortion disease. Corn. Vet., xvi (2), p. 127.
1926—Bang's abortion disease in cattle. Corn. Univ. Ext. Bul. 137.

Blanck, Erik.
1925—Finnas serologiskt skiljbara typer av den bangska abortbakterien? (Are there serologically distinguishable types of Bang's abortion bacillus?) Meddelanden från Statens Veterinärbakteriologiska anstalt, xxv.

Bluhm, W.
1926—Klinische Untersuchungen von Bullen in Abortusbestanden. (Clinical examinations of the bulls in abortion herds.) Tierärzt. Rdsch., p. 325. Abst. in Cent. f. Bakt., I Abt., Ref. 83, p. 314.

Breguet, M.
1926—The differentiation and classification of strains of Brucella. Compt. Rend. Soc. Biol., Paris, xciv (16), pp. 1178-89. Abst. in Exp. Sta. Rec lv, p. 272.

Bryant, John B.
1926—Abortion from the practitioner's standpoint. Jour. A. V. M. A., lxx, n. s. 23 (1), pp. 32-37.

Bux, Joe H.
1926—Efforts to prevent the spread of infectious bovine abortion by application of serological tests to importations of breeding and dairy animals. Jour. A. V. M. A., lxx, n. s. 23 (3), pp. 320-322.

Carpenter, C. M.
1926—*Brucella abortus* in udders of vaccinated and naturally infected cattle. Corn. Vet., xvi (2), p. 133.

1926—A comparison of strains of *Brucella abortus* isolated from man with those from cattle. Jour. Inf. Dis., xxxix, p. 215.

1926—Agglutinins for *Brucella abortus* in the blood of man. Jour. Inf. Dis., xxxix, p. 220.

1926—Directions for collecting blood samples for the agglutination test for infectious abortion. Diagnostic Lab., N. Y. State Vet. Coll., Corn. Univ.

Carpenter, C. M., & Merriam, H. E.
1926—Undulant fever from *Brucella abortus*. Jour. Amer. Med. Asso., lxxxvii, p. 1269.

Cerruti, Carlo.
1926—A proposito di un saggio di agglutinazione aspecifica per la differenziazione del m. melitense dal b. di Bang. (An attempted non-specific agglutination in the differentiation between *B. melitensis* and Bang's bacillus). Estratto dal Giorn. di Batter. e Immonol., i (8), p. 422. Abst. in Bul. de l'Inst. Past., xxiv, p. 833.

Christiansen, M.
1926—Bacterium abortus als ursache der nekrotisieranden Orchitis (orchitis mortificans) biem Stier. (*Bacterium abortus* as the cause of necrotic orchitis in bullocks.) Maan. f. Dyrl., xxxvii, p. 545. Abst. in Bul. de l'Inst. Past. Microbiologie, xxiv, p. 726. Abst. in No. Amer. Vet., vii (9), p. 32.

Comstock, E. D., Jr.
1926—The breeder's viewpoint of abortion disease. An. Path. Exch., Univ. Ill., Sept. & Oct., 1926. No. Amer. Vet., vii (11), pp. 25-30.

Corwin, George E.
1926—Abortion vaccine an important factor in the economic control of abortion disease. Jour. A. V. M. A., lxx, n. s. 23 (3), pp. 323-337.

Courtoise-Suffit, Garnier & Liège.
1926—Fievre de Malta guerie a la suite de l'injection de 'endoproteine de bacillus abortus Bang. (Malta fever cured following the injection of endoprotein of *Bacillus abortus*.) Presse Med., p. 885. Abst. in Cent. f. Bakt., I Abt., Ref. 84, p. 458.

Dubois, M.
1910—Revers cas de fievre de Malta, d'origine ovine, chez l'homme. (A severe case of Malta fever of ovine origin in man. Revue Vet., lxvii, p. 540.
1910—La fievre de Malta chez les poules. (Malta fever of poultry.) Revue Vet., lxvii, p. 490.

Edwards, F. R., & Coffman, J. H.
1926—A promising treatment for infectious abortion. Ga. Exp. Sta. Press Bul. 252. Abst. in Exp. Sta. Rec., lvi, p. 278.

Ehrlich.
1926—Schutzt die Impfung mit lebenden Abortusbakterin Jungrinder gegen seuchenhaftes Verwerfen? (Does the injection of living abortus bacterin protect young cattle against infectious abortion?) Deut. Tierärzt. Eschr., p. 289. Abst. in Cent. f. Bakt., I Abt., Ref. 83, p. 315.
1926—Ein fall von Bangscher Abortusinfektion beim Bullen. (A case of Bang's abortus infection in the bull.) Deut. Tierärzt. Wchnschr., No. 26, June 26, 1926, p. 469. Abst. in Bul. de l'Inst. Past., xxiv, p. 725.

Enrico, C.
1926—La resistenza al calore delle agglutinine antibang e antimelitense. (The resistance to heat of abortus and melitensis agglutinins.) Ann. d'Igiene, xxxvi (12), p. 825. Abst. in Bul. de l'Inst. Past., xxv (1927), p. 251.

Favilli, G.
1926—Ricerche e considerazioni critiche sulla febbre mediterranea e sull' aborto spizootico. (Researches and a critical consideration of Mediterranean fever and epizootic abortion.) Estr. norm. e. patol., lxxx (1), p. 41. Abst. in Cent. f. Bakt., I Abt., Ref. 84, p. 458.
1926—Die alcune agglutinazioni aspecifiche nei batteri del gruppo abortus—melitenses—paramelitensis. Effectti prodotti sugli stessi batteri dal ripextuto trattamento con sieri immuni. (On some non-specific agglutinations in the abortus-melitensis-paramelitensis group of bacteria. Effects produced by the same bacteria by the repeated treatment with immune sera.) Lo Sperimentale, lxxx (4). Abst. in Bul. de l'Inst. Past., xxv (1927), p. 251.

Fitch, C. P.
1926—The value and need of uniform methods for conducting tests for bovine infectious abortion, with an account of experimental work. Proc. 30th Ann. Meet., U. S. Live Stock San. Asso., p. 180. Jour. A. V. M. A., lxx (1927), n. s. 23 (6), pp. 866-874.

Fitch, C. P., Boyd, W. L., & Lubbehusen, R. E.
1926—Preliminary report of experimental work in the control of bovine infectious abortion. Jour. A. V. M. A., lxix, n. s. 22 (3), pp. 362-369.

Fitch, C. P., & Lubbehusen, R. E.
1926—A study of the value of whole milk and milk sediment for the isolation of *Bacterium abortus* Bang. Jour. Series, Minn. Agr. Exp. Sta., Paper 587. Corn. Vet., xvi (1), p. 46.

Francis, E., & Evans, A. C.
1926—Agglutination, cross-agglutination and agglutination-absorption in tularemia. U. S. Public Health Rpts., xli (26), p. 1273.

Gage & Gregory.
1926—Human infection with *Brucella melitensis* variety *abortus* treated with mercurochrome. Jour. Amer. Med. Asso., lxxxvii, p. 848.

Gilman, H. L., & Birch, R. R.
1926—The passage of *Bacterium abortum* through the digestive tract of cattle. Rpt. N. Y. State Vet. Coll. 1925-26, No. 28, p. 118.

Giltner, Ward.
1926—Vaccination against *Brucella abortus* with non-virulent cultures. Jour. Comp. Path. & Therap., xxxix, p. 318.
1926—A vaccination for bovine abortion. Breeder's Gazette, xc, p. 522.

Goiny, A.
1926—Observations sur la fievre ondulante depuis 1920. (Observations on undulant fever since 1920). Bul. Soc. Sci. Med., Montpellier, June, 1926. Abst. in Bul. de l'Inst. Past., xxv (1927), p. 1066.

Hagan, W. A.
1926—The value of placental examination for the diganosis of infectious abortion of cattle. Corn. Vet., xvi, p. 274.

Hallman, E. T.
1926—Report of the Section of Animal Pathology of the Michigan Station. Mich. Agr. Exp. Sta. Rpt. 1924, p. 170. Abst. in Exp. Sta. Rec., liv (7), p. 676.

Hart, George H.
1926—Controlling contagious abortion. Hoard's Dairyman, lxxi (9), p. 336.

Hart, George H., & Traum, J.
1926—The relation of the subcutaneous administration of living *Bacterium abortus* to the immunity and carrier problem of bovine infectious abortion. Univ. of Calif. Exp. Sta. Tech. Paper 19, pp. 50. Abst. in Cent f. Bakt., I Abt., Ref. 84, p. 649.

Huddleson, I. F.
1926—Is *Bact. abortus* (Bang) pathogenic for human beings? Jour. Amer. Med Asso., lxxxvi, p. 443. Abst. in Cent. f. Bakt., I Abt., Ref. 83, p. 549. Abst. in Arch. Path. a Lab. Med., i (4), p. 672. Abst. in Bul. de l'Inst. Past. Microbiologie, xxiv, p. 725.

1926—A study of *Bact. abortus*-like organisms. Mich. Agr. Exp. Sta. Rpt. 1924, p. 184. Abst. in Exp. Sta. Rec., liv, p. 676.

Kalkus, J. W.
1925—Report of the Washington station. Division of Veterinary Science. Wash. State Coll. Sta. Bul. 196, p. 42. Abst. in Exp. Sta. Rec., liv, p. 870.

Klarin, Eugen.
1926—Om Kastning Genom Spirillinfektion. (About infectious abortion through spirillinfection.) Meddelanden från Statens Veterinärbakteriologiska anstalt, xxix.

Krage.
1926—Das Immunisierungsverfahren gegen den infektiosen abortus des Rindes. (The immunization methods against infectious abortion of cattle.) Tierärzt, Rdsch., p. 333. Abst. in Cent.f. Bakt., I Abt., Ref. 83, p. 316.

Lentz, W.
1926—Vergleichende Untersuchungen über den Wert der Agglutination und der Komplementbindung bei der Erstellung des seuchenhaften Verkalbens. (Comparative researches concerning the value of agglutination and complement fixation tests in the diagnosis of infectious abortion.) Deut. Tierärzt. Wchnschr., No. 31, p. 557. Abst. in Bul. de l'Inst. Past., xxiv, p. 743.

Lerche.
1926—Beitrag zur infektion des Bullen mit Abortus-Bang-Bakterien. (On the infection of the bull with *B. abortus* bacillus.) Tierärzt. Rdsch., p. 469. Abst. in Cent. f. Bakt., I Abt., Ref. 84, p. 726.

Lisbonne & Deveze.
1926—La sero-agglutination et la vaccinotherapie dans la melitococcie. (The sero-agglutination and the vaccine-therapy of Malta fever.) Bul. de l'Inst. Past., xxv (1927), p. 1066.

Lothe, Herbert.
1926—Abortion in cows. Jour. A. V. M. A., lxx, n. s. 23 (1), pp. 38-42.

Lubbehusen, R. E., & Fitch, C. P.
1926—A report of experimental work on the bull as a factor in the spread of infectious abortion. Jour. A. V. M. A., lxviii, n. s. 21 (4), pp. 467-480. Abst. in Cent. f. Bakt., I Abt., Ref. 84, p. 726. Abst. in Exp. Sta. Rec., liv, p. 873.

Lubbenhusen, R. E., Fitch, C. P., & Boyd, W. L.
1926—A study of the value of the living vaccine in the control of bovine infectious abortion. Corn. Vet., xvi, p. 166. Univ. Minn. Agr. Exp. Sta. Tech. Bul. 43.

Magnusson, H.
1925—Ein Fall von abortusinfektion beim Stier. (A case of abortus infection in the bullock.) Akand. Veter. Tdsk., Dec., 1925. Abst. in Bul. de l'Inst. Past., xxiv (1926), 16, p. 726.

Matthews, F. P.
1926—Experiments on the longevity of *Alcaligenes abortus*. Jour. A. V. M. A., lxix, n. s. 22 (1), pp. 80-82.

1926—The diagnosis of infectious abortion with special reference to agglutinating limits. Jour. A. V. M. A., lxix, n. s. 22 (5), pp. 613-620.

Mayo, N. S.
1926—Bovine abortion disease. Jour. A. V. M. A., lxix, n. s. 22 (2), pp. 230-231. Abst. in Cent. f. Bakt., I Abt., Ref. 84, p. 728.

Meigs, Edward B.
1926—Evidence that nutritional deficiencies are factors in the problems of abortion and sterility in dairy cattle. Proc. 30th Ann. Meet., U. S. Live Stock San. Asso., p. 169. Jour. A. V. M. A., lxx (1927), n. s. 23 (6), pp. 855-866.

Melchoirre & Zanzucchi.
1926—Aborto epizootico e metrite post abortiva curata con auto vaccino polibatterico. (Epizootic abortus and post-abortive metritis cured by poly-bacterin auto-vaccination.) Clin. Vet., p. 197. Abst. in Bul. de l'Inst. Past. xxiv (18), p. 793.

Messieri, A.
1926—Studio sperimentale sull'infezione da germi del genere "Brucella" nella specie canina. (Experimental study of infection by germs of the genus Brucella in the canine species.) La Nuova Vet., Dec. 15, 1926, p. 317 Abst. in Bul. de l'Inst. Past., xxv (1927), p. 206.

Moore, V. A., & Carpenter, C. M.
1926—Undulant fever in man associated with bacteria indistinguishable from *Brucella abortus*. Corn. Vet., xvi, p. 147.

Nelson, John B.
1926—A rapid method for the isolation of *Bacillus abortus* from uterine exudate and diseased placenta. Jour. Exp. Med., xliii, p. 331. Abst. in Cent. f. Bakt., I Abt., Ref. 83, p. 314.

Ohlsson, L.
1926—Veranderung des Hodens beim stier, verursacht durch Infektion mit Bang's abortusbazillen. (Changes in the testicles of the bullock as a result of infection with Bang's abortus bacillus.) Skand. Veter. Tdsk., p. 25. Abst. in Bul. de l'Inst. Past., xxiv (16), p. 727.
1926—Testikelförändringar Hos Tjur Förorsakade av Infektion med Bang's Abortbaciller. Meddelanden från Statens Veterinärbakteriologiska anstalt, xxviii.

Orcutt, Marion L.
1926—Agglutination affinities of the abortus-melitensis group of bacteria with special reference to two human strains. Jour. Exp. Med., xliii, p. 225. Abst. in Cent. f. Bakt., I Abt., Ref. 82, p. 509.

Plum, N.
1926—Tuberculous abortion among cattle. Corn. Vet., xvi (4), p. 237. Jour. A. V. M. A., lxix, n. s. 22 (4), pp. 441-451.

Polittini, B.
1926—Ulteriore controbuto alla questione dei rapporti fra M. Melitensis e B. abortus Bang. (A recent contribution on the question of the relationship between *M. melitensis* and *B. abortus* (Bang).) Giorn. di Batter. e Immunol., p. 297. Abst. in Cent. f. Bakt., I Abt., Ref. 84, p. 457.

Proscholdt.
1926—Uber die Ermittelung von Rinderbestanden mit abortus Bang infektion durch die Blutunersuchung der Merrschweinchen, die zum Zwecke des Tuberkelbacillennachweises mit Milch. Uterussekret und Bronchialschleimproben geimpft waren. (On the determination of herds infected with Bang's abortion disease through blood examination of guinea pigs injected with milk, uterine exudate and bronchial exudate for the purpose of the demonstration of tuberculosis bacilli.) Deut. Tierärzt. Wchnschr., p. 42. Abst. in Cent. f. Bakt., I Abt., Ref. 82, p. 465.

Rettger, L. F., McAlpine, J. G., White, G. C., & Johnson, R. E.
1926—Infectious abortion in cattle. (Ninth report.) Storrs Agr. Exp. Sta. Bul. 137, pp. 3-17. Abst. in Exp. Sta. Rec., lv, p. 175.

Sanarelli, G.
1926—Infection par le melitococcus et le bacillus abortus chez l'homme. (Infection of man by the micrococcus of Malta fever and the abortus bacillus.) Presse Med., p. 571. Abst. in Cent. f. Bakt., I Abt., Ref. 83, p. 297.

Sanden, Sven-Olaf, & Ohlsson, Lorenz.
1926—Experimentell provning av abortvaccinens formaga att forhindra kastning. (Experimental tests on the ability of abortion vaccine to prevent abortion.) Meddelanden från Statens Veterinärkabteriologiska anstalt, xxxiii.

Sanden, Sven-Olaf.
1926—Komplementbindningstesultat vid manatliga undersokningar av blodprov fran kreatur tillhorande an av smittsam kastning angripen besattning, som ej behandlats varken med vaccin eller desinfektionsmedel. (Results of monthly complement fixation tests on blood samples from cattle belonging to a herd affected with infectious abortion which was not treated with vaccine or disinfectants.) Meddelanden från Statens Veterinärbakteriologiska anstalt, xxxii.
1926—Om immuniteststidens langd efter vaccination med dodade abortbakterior pa notkreatur bedomd med hjalp av komplementbindning. (About the duration of immunity in cattle following vaccination with killed abortion bacilli as judged with complement fixation.) Meddelanden från Statens Veterinärbaketriologiska anstalt, xxx.

Schumann.
1926—Massnahmen zur Einschrankung des seuchenhaften Verkalbens. (Precautions against infectious abortion.) Deut. Tierärzt. Wchnschr., p. 44. Abst. in Cent. f. Bakt., I Abt., Ref. 82 (4), p. 466.

Seddon, H. R.
1926—What happens in animals infected with the contagious abortion germ. Agr. Gazette of N. S. W., Feb. 1, 1926, p. 165. Misc. Publication 2, p. 564.

Simms, B. T., & Miller, F. W.
1926—Practical results of attempts to control abortion disease. Jour. A. V. M. A., lxviii, n. s. 21 (4), pp. 455-461. Abst. in Exp. Sta. Rec., liv, p. 873.

Smith, Theobald.
1926—The relation of the *Bacillus abortus* from bovine sources to Malta fever. Jour. Exp. M7d., xliii, p. 207.
1926—Variations in CO_2 requirements among bovine strains of *Bacillus abortus*. Jour. Exp. Med., xliii, p. 317. Abst. in Cent. f. Bakt., I Abt., Ref. 83, p. 314. Abst. in Biol. Absts., i, p. 109.

Smith, Theobald, & Little, R. B.
1926—Further data on the effect of vaccination against bovine infectious abortion. Jour. Exp. Med., xliii, p. 327. Abst. in Corn. Vet., xvi, p. 303. Abst. in Biol. Absts., i, p. 90.

Steinert, Kurt.
1926—Zur Frage: Ist der Bacillus abortus Bang fur Menchen pathogen? (Concerning the question: Is *Bacillus abortus* (Bang) pathogenic for man?) Munchen. Tierärzt. Wchnschr., lxxvii, Jahragang. Abst. in Cent. f. Bakt., I Abt., Ref. 83, p. 549.

Storrs Agr. Exp. Sta.
1926—Infectious abortion in cattle. Storrs Agr. Exp. Sta. Bul. 137.

Tapia, Manual, et a. Martin de Micholas.
1926—Sobre la posible differenciacion serologica entre el micrococcus melitensis de Bruce y el Bacillus abortus de Bang. (Concerning the possible serological difference between *Micrococcus melitensis* (Bruce) and *Bacillus abortus* (Bang).) Arch. de med. cirurg. y. esp., xxiv, p. 104. Bul. de l'Inst. Past., xxix (1927), p. 251 and p. 834.

Trentini, S.
1926—Sull 'agglutinazione con l'acido lattico come mezzo di differenciazione del M. melitensis dal B. abortus (Bang). (On agglutination with lactic

acid as a means of the differentiation between *M. melitensis* and *B. abortus* (Bang).) Pathologica, xviii, p. 309. Abst. in Bul. de l'Inst. Past., xxiv, p. 833.

U. S. Live Stock Sanitary Asso.
1926—Report of committee on bovine infectious abortion. Proc. 30th Ann. Meet., U. S. Live Stock San. Asso., p. 188. Jour. A. V. M. A., lxx(1927), n. s. 23 (6), pp. 874-879.

Vedel, Giraud & Peuch.
1926—A propos de quelques cas de fievre de Malta, etc. (Some cases of Malta fever, etc.) Bul. Soc. Sci. Med., Montpellier, June, 1926. Abst. in Bul. de l'Inst. Past., xxv (1927), p. 1066.

Wall, Sven.
1926—Om vaccination mot smitsam kastning hos nötkreatur. (Vaccination against infectious abortion in cattle.) Meddelanden från Statens Veterinärbakteriologiska anstalt, xxvii.

Wall, Sven, & Sanden, Sven-Olaf.
1925—Om stridsmedel mot smittsam kastning hos nötkreatur. (On remedies for infectious abortion in cattle.) Meddelanden från Statens Veterinärbakteriologiska anstalt, xxvi.

Ween, E.
1926—Forholdsregler mot den smitsomme kastning. (Control measures against infectious abortion.) Norsk. Veter. Tdsk., Oslo, xxviii (7-8), p. 185.

White, G. C., Johnson, R. E., Rettger, L. F., & McAlpine, J. G.
1926—Infectious abortion in cattle. (Eighth report.) Some economic phases of *Bacterium abortus* infection and other observations in dairy herds. Storrs Agr. Exp. Sta. Bul. 135, p. 405. Abst. in Exp. Sta. Rec., liv., p. 774.

Wilson, G. S., & Nutt, M. M.
1926—The occurrence of *Brucella abortus* and *Mycobacterium tuberculosis* in cow's milk. Jour. Path. & Bact., xxix, p. 141. Abst. in Exp. Sta. Rec., lv, p. 175. Abst. in Biol. Absts., i, p. 100.

VETERINARIANS INTERESTED IN CERTIFIED MILK

The following veterinarians are vice-presidents of the Certified Milk Producers' Association of America, Incorporated: Dr. Hulbert Young, Baltimore, Md.; Dr. A. E. Merry, Avon, N. Y.; Dr. Cassius Way, New York, N. Y.; Dr. A. S. Wheeler, Biltmore, N. C.

Dr. J. P. Bushong, of Los Angeles, Calif., is regional secretary for the Pacific coast. Dr. F. D. Holford, chief veterinarian of Borden's Milk Products Company, is a member of the Executive Committee.

Dr. Maynard Rosenberger, of Reseda, Calif., Dr. C. I. Corbin, of Leonia, N. J., and Dr. Cassius Way, of New York, N. Y., are members of the Scientific Research Committee. Dr. F. D. Holford is also chairman of the Development Committee, with Dr. A. E. Merry as a member.

"Did that new play have a happy ending?"

"Sure. Everybody was glad when it was over."—*Liberty.*

ASSOCIATION MEETINGS

MISSOURI VALLEY VETERINARY ASSOCIATION

The thirty-fourth annual meeting of the Missouri Valley Veterinary Association, which was held at Omaha, Nebraska, July 11-12-13, 1927, was considered by the 178 veterinarians who were in attendance as highly successful, both from the standpoint of numbers and interest in the program as well as good feeling and pleasant time. Thirty-eight ladies enjoyed the excellent program provided by the Omaha veterinarians and commercial houses. Nineteen new members were added to the roll, which makes the membership in good standing approximately 250.

Registration was required of all those entering the meeting-room and members were required to pay dues and visitors to pay a registration fee of $3.00, which is the same as dues. This plan proved very successful from the treasurer's point of view and was generally well received by all those attending, although not well understood by a few. The registration-fee system is being accepted and urged for all conventions as the fairest method of meeting local expenses incurred and it is certain that if veterinarians are to have programs, which are worth the time and expense, the necessary funds must be secured some way. Besides, registration prevents undesirable people from attending, for each visitor had to be approved by a member.

The talent for the program was carefully selected and all the speakers gave their listeners their money's worth, for the subjects were highly interesting and instructive. Dr. A. F. Schalk, of the North Dakota Experiment Station, spoke on "Sweet Clover Poisoning" and on "Some Phases of Ruminant Digestion" and his discussions were very complete and up to the minute. Dr. T. A. Sigler talked on the A. V. M. A. and his experiences as president. We were glad to have him with us and appreciated his effort in attending, in spite of his recent injuries. Dr. J. W. McGinnis, practitioner at Ord, Nebraska, gave a very interesting account of his experiences in treating several hundred horses for bots. Dr. Cooper Curtice, of the U. S. B. A. I., addressed the Association on "Parasites of Sheep." He said that he considered the combination of the copper sulphate and tobacco treatments for stomach worms was more effective than either one alone and

that this combination disposed of some other intestinal parasites as well.

Dr. E. D. Criswell, of King City, Mo., presented "My Method of Building a Poultry Practice." He brought out that he built his poultry practice to over $100 a month by advertising in the local paper that he did poultry work; by holding free postmortems and by talking poultry diseases when on other calls and, incidentally, picking out sick chickens and holding autopsies at the farm. Dr. Alvin Broerman, of the Ohio Department of Agriculture, gave a very interesting and comprehensive discussion of poultry diseases, more especially of chicks. He also demonstrated, at the clinic, the various biologic tests and showed his method of administering medicines to chickens. A great deal of interest was shown in his talk and many points brought out, although time was too limited to give this subject the consideration it merited.

Dr. C. W. Bower, of Topeka, Kansas, presented the subject, "The Use of the X-ray and Fluoroscope in Small Animal Practice," and he pointed out the many occasions he has for these instruments and also discussed the principles of their use. Dr. W. M. McLeod, of the Veterinary Division, Kansas State Agricultural College, Manhattan, presented a paper on "Intraspinal Anesthesia in Equines and Bovines." He also demonstrated this new work at the clinic. This is the first veterinary meeting at which spinal anesthesia in horses was presented or demonstrated, and it created much interest, for it seemed very practical. Dr. McLeod also demonstrated the use of the new wire obstetrical saw invented by Dr. Benesch, of Vienna, Austria. Five of these saws were sold at the meeting. Its use should do away with all embryotomy operations and make obstetrical work a much easier task for the practitioner, as pointed out by Dr. Benesch at the A. V. M. A. meeting at Lexington, Ky.

Dr. Herbert Lothe, of Waukesha, Wis., conducted a very interesting question-box on dairy-cattle problems, covering sterility work, udder operations and digestive disturbances. He answered the questions from his experiences in every-day practice in a manner that was very useful and instructive. Dr. Lothe also demonstrated sterility operations from specimens of diseased genital organs before the clinic.

Dr. H. E. Biester, of the Veterinary Division, Iowa State College, Ames, presented an illustrated talk on "Infectious Enteritis in Swine," in which he showed very clearly the pathology of

the condition and the mode of infection. He also demonstrated, at the clinic, the microscopic examination of feces of dogs for parasite eggs. He recommended the centrifuge method over the smear method, pointing out that he could secure a sample thus which had 600 times the concentration of eggs the smear method would secure. He used the sugar solution to float the eggs in the centrifuge. The entire time for this method of examination would not exceed ten minutes and the examination would be complete and much more thorough than the smear method.

For the clinic, Dr. L. V. Skidmore, of the University of Nebraska, demonstrated the proper methods of collecting and shipping material for laboratory examination. He pointed out errors and how to correct them, stating that a laboratory was dependent on the proper cooperation of the practitioner in carefulness in sending in specimens, in order to secure the most help by laboratory assistance.

The Association passed a resolution of thanks to all the contributors to the program, to the local committee for the excellent arrangements and entertainment, to the Omaha Chamber of Commerce for its splendid cooperation and to all those who had helped make the meeting a success. The Executive Board decided that the next meeting will be in Kansas City, Mo., some time in July, 1928.

The following officers were elected: President, Dr. E. L. Dicke, Louisburg, Kansas; vice-president, Dr. C. J. Scott, Knoxville, Iowa; secretary-treasurer, Dr. E. R. Steel, Kansas City, Mo. The following trustees were elected: Drs. H. M. Kirk, Griswold, Iowa; J. W. McGinnis, Ord, Nebr.; J. W. Chenoweth, Albany, Mo.; Arthur Kushner, Topeka, Kans.; Thos. P. Crispell, Parsons, Kans.

E. R. STEEL, *Secretary.*

VIRGINIA STATE VETERINARY MEDICAL ASSOCIATION

The thirty-fourth semi-annual meeting of the Virginia State Veterinary Medical Association was called to order by the President, Dr. J. T. Wilson, in the Ocean View Hotel, Ocean View, at 1:30 p. m., July 14, 1927, with fifteen members and two visitors present.

The books of the Association and the Secretary not being present, it was necessary to dispense with the reading of the min-

utes and the roll-call. President Wilson appointed Dr. George C. Faville secretary *pro tem.*

President Wilson, in his address, deplored the fact that the Secretary had been too busy to do anything regarding the program for this meeting and explained that the program as presented was the result of telegraphic correspondence and of the hearty cooperation of those who would take part.

The President read a letter from Dr. W. H. Ellett, secretary of the Association, in which Dr. Ellett expressed the wish that the Association would accept his resignation as secretary, his business being such that he could not attend to the duties. It was moved by Dr. Willis that Dr. Ellett's resignation be accepted. (Carried.) Moved by Dr. Willis that Dr. George C. Faville be elected secretary to fill the unexpired term. Carried and Dr. Faville declared elected secretary.

Dr. I. D. Wilson, of Virginia Polytechnic Institute, Blacksburg, gave a very interesting talk on the use of the agglutination test for bacillary white diarrhea in chickens and demonstrated the use of a short test given by use of a concentrated antigen. He also said the same method could be used in the diagnosis of infectious abortion in cattle and suggested that the members could assist in the investigations being conducted by his department, by field work along this line and then sending samples to his department for checking. Dr. Wilson also exhibited a number of specimens of parasites from fowls and spoke of the extent of avian tuberculosis in some of the flocks in the State. Dr. Wilson's address was listened to with great interest and it was generally regretted that it had not been written so that it could be published. Moved that a vote of thanks be extended Dr. Wilson for his very instructive address. (Carried.)

Dr. J. E. Shillinger, associate veterinarian of the Food, Drug and Insecticide Administration of the Department of Agriculture, Washington, D. C., read a very entertaining paper on "The Control of Parasites." This was greatly enjoyed and on motion was ordered to be sent to the veterinary journals for publication. Dr. Shillinger's paper was discussed by Drs. Willis, White and others.

During the last session of Congress, provisions were made for a re-organization within the Department of Agriculture and there accordingly came into existence, July 1, a new unit which is known as the Food, Drug and Insecticide Administration of the U. S. Department of Agriculture. Dr. B. T. Woodward, veter-

inarian of this Administration, stated that this branch of the government was of particular interest to veterinarians, as it was charged with the enforcement of the Pure Food and Drugs Act, the Insecticide and Fungicide Act and the new Import Milk Act.

The wide distribution of various proprietary remedies alleged to be efficacious in the treatment of various diseases of live stock and the eradication of both internal and external parasites affecting them has always been an important factor in continuing the existence of and spreading communicable diseases and infestations with parasites. Despite the efforts of the practicing veterinarian to educate his clients to the importance of the scientific control of diseases and parasites and the vigorous efforts of the state live stock sanitary organizations, particularly in reference to the control and eradication of such diseases as tuberculosis and abortion in cattle, and hog cholera, the distribution of alleged remedies for these conditions has maintained centers of infection which tend to nullify the control efforts of the veterinarians.

The manufacturer and distributor of these proprietary preparations is, in effect, an unlicensed non-professional competitor, who not only causes increased suffering of live stock, and the spreading of disease among them, but also interferes with the normal clientele due the practicing veterinarian in each community. The Food, Drug and Insecticide Administration is studying these problems and has caused a large number of manufacturers to remove from their labels and literature such therapeutic claims as are considered to be false and fraudulent. It has already caused the removal from the market, without court action of three so-called abortion remedies, and a trial in a federal court gave a decision in favor of the government against "Bowman's Abortion Remedy," the sales of which have been completely discontinued. One of the large breed association papers of the cattle industry has voluntarily agreed to exclude all advertising relating to the so-called abortion remedies. The Administration desires the state live stock veterinary organizations and the practicing veterinarians to utilize it as a cooperative agency for their benefit.

This ended the literary portion of the program. After supper, the members all met at the Willoughby Spit dock and boarded the motor schooner *Pearl D. Evans* for a sail on the bay. The day had been hot, but the night was clear and a good breeze and full moon made conditions perfect for a delightful time.

On Friday the meeting was called to order at 10:00 a. m. and there being no report from the Board of Censors, the members

took the trolley car for Dr. Gilchrist's hospital, in Norfolk, for an all-day clinic.

Preparations had been made and the members found themselves in the large, light, cool room where seats had been provided and they settled themselves for a good time. Dr. J. C. Flynn, of Kansas City, was introduced and for about two hours spoke on various phases of small-animal practice, including various questions of breeding and care of dogs and cats, methods of restraint, diagnosis of diseases and lines of treatment. At 1:00 p. m. the Association adjourned to the Southland Hotel for dinner and at 2:00 p. m. were back in the hospital to witness the clinic. Dr. Flynn very skillfully demonstrated methods of restraint, sutureless spaying of the dog and cat, castration of the cat without restraint and other operations that were of interest.

The members were also called upon to diagnose some peculiar ailment in mules and horses and Dr. J. T. Wilson gave a demonstration of spinal anesthesia in a cow. The demonstrations lasted until some had to leave to get their trains. Others stayed until time for supper. It is to be regretted that some of those who were most anxious to have a clinic at this meeting were not present. Your secretary has been present at every meeting of the Association except two. This in many respects was the best meeting we have ever had. The members present were enthusiastic and enjoyed every moment of the time.

Adjourned to meet in Richmond, the second Thursday in January, 1928.

GEO. C. FAVILLE, *Secretary.*

MARYLAND STATE VETERINARY MEDICAL ASSOCIATION

The semi-annual meeting of the Maryland State Veterinary Medical Association was held at the University of Maryland, College Park, July 21-22, 1927, with about seventy-five in attendance.

The meeting was called to order by the President, Dr. F. W. Cruickshanks, Hagerstown. His address was rather brief, but both interesting and instructive. Dr. Cruickshanks called attention to the fact that we should feel justly proud that we are receiving very favorable recognition by other professions, as well as the high officials of the Department of Agriculture. We have forced them to recognize the great and far-reaching im-

portance of controlling the diseases of our live stock, especially meat- and milk-producing animals. From this we may feel that the profession is responsible, to a great extent, for our national health and vigor, and is a keystone underlying nation-wide prosperity.

Our profession has undergone, and is still passing through, a very trying period, due to the great reconstruction period after the World War. The veterinarians of the past who were trained to treat horses have found it hard to meet the present situation, and some are finding it rather difficult to get along. There is also a great decrease in the number of young men entering training institutions, but we must recognize the fact that we are getting a very fine class of young men and the colleges are giving them a wider knowledge of the subject matter. We are being recognized as a learned profession and, if we are to maintain our position, we must do our part individually by giving the closest attention to the new facts acquired by research in our institutions, so that we may be able to give the very best service to our clientele. We must not let down the bars, but set the standards higher.

A highly efficient veterinary service for the agricultural industry, made up of professional men who fully comprehend the terrors of animal disease, from both the economic and public health standpoints, are valuable men to the nation. They stand as a barrier between the farmer and the millions of dollars of losses from animal plagues, and between these plagues and the food-consuming public.

Dr. Frank Ryan, of Middletown, presented a case report entitled, "Botulism (?) in Hogs." As this subject is of a somewhat controversial nature, the paper was received with the keenest interest. Several hogs were made very sick from eating a quantity of spoiled home-made jelly. The symptoms were most suggestive of botulism. They included sub-normal temperature, cyanosis, paralysis of the throat, etc. The animals were given symptomatic treatment, the medication being administered with the aid of the stomach-tube. In about twenty-four hours from the onset of the trouble, the hogs were much improved. They made rapid recoveries.

Some of the remaining jelly was fed to rabbits, guinea pigs and chickens, experimentally, at College Park. One rabbit died. Bacteriological examinations of this material are being carried on, both by the U. S. Bureau of Animal Industry, and

the Department of Bacteriology of the University of Maryland. The findings have not been completed to date.

The discussion that followed this report included several similar cases noted by others. The causative feeds in these cases were home-canned string beans and peas. In one outbreak approximately one-half of the affected animals were treated with botulinus antitoxin. All but one of these survived. The untreated chicks all died.

The next paper was presented by Dr. L. B. Ernest, of the U. S. Bureau of Animal Industry. It was entitled, "Recent Developments in Handling Johne's Disease." (Published in this issue of the JOURNAL.)

The next and last paper of the morning session was delivered by Prof. E. S. Savage, Department of Animal Husbandry, Cornell University. The subject was "Feeding Dairy Cows Today." The essentials considered in a complete ration were given as follows: an adequate amount of food; an adequate amount of protein, complete as to quality; an adequate amount of minerals; an adequate amount of vitamins; palatability; succulence; variety; suitability, and economy.

More or less emphasis has been placed on roughage, but we were glad to learn that the present trend is to place still more emphasis on this most important portion of the diet. There also seems to be a movement on foot to break away from the more complex, high-protein, grain-mixture feeds and to substitute for them, as far as practicable, the home-grown feeds. This paper was received with a great deal of enthusiasm.

The afternoon was devoted to demonstrations and clinics. The demonstrations consisted of a johnin test on an infected animal; postmortem examination of poultry; and the agglutination test for contagious abortion. The clinics included both large and small animal cases.

The first paper on the program, Friday morning, was entitled "Case Reports," and was presented by Dr. J. W. Hughes, of Ammendale. The first part of the paper contained data on the use of ovarian extract in cattle. The remainder had to do with the use of autogenous bacterins in the treatment of mastitis in cattle. The data presented on both of these subjects were very complete. This case report will be published later.

The second paper consisted of a case report, and was given by Dr. C. M. Grubb, of Rockville. The author gave a detailed description of the technic employed in cesarian section in a sow.

The subject was very well handled and was received with much interest. Dr. Grubb feels that a wider use of this operation would result in saving many more brood sows and their litters.

The third paper was delivered by Dr. J. E. Shillinger, of the Bureau of Animal Industry, and was entitled, "Methods of Treatment and Difficulties Encountered in Parasitic Control." The subject was handled in a most able manner and held the undivided attention of the listeners to the end. It was also followed by a most pertinent discussion, in spite of the fact that the program was running very much behind schedule.

The fourth paper was an address by Dr. J. H. McNeil, state veterinarian of New Jersey. It was an illustrated lecture on the cattle industry of several countries in South America. The different types of cattle were shown. The problems encountered, and the methods often employed in solving them, lead us to believe that the animal industry of the United States has much for which to thank the veterinary profession.

The last paper was entitled, "The Value of Postmortem Pathology to the Practitioner." It was delivered by Dr. E. A. Benbrook, of Iowa State College. As the meeting was materially behind schedule, the author consumed but little time. The talk, however, brought out many points which proved to be real subjects for thought. Aside from the information usually obtained from postmortem examinations, such as determining the cause of death, making and confirming diagnoses, determining the extent and age of the lesions, etc., means are provided for practice in operations, reviewing anatomy, etc. The paper was a valuable contribution to the program.

The afternoon was devoted to demonstrations and clinics. The demonstrations consisted of postmortem examinations on dogs for parasites, by Dr. J. E. Shillinger; a postmortem demonstration on a horse, by Dr. E. A. Benbrook; and a demonstration of spinal anesthesia on a cow, by Dr. R. V. Smith.

The clinics were provided with more large and small animal cases than could be cared for in the time available.

The principal operators during the two days' clinics were Drs. E. B. Dibbell, W. P. Collins, R. V. Smith and F. W. Cruickshanks.

E. M. PICKENS, *Secretary.*

NORTHEASTERN PENNSYLVANIA VETERINARY MEDICAL CLUB

A meeting of the Northeastern Pennsylvania Veterinary Medical Club was held July 26, 1927, at the Montrose Beef Company plant, near Pittston, at which time the members were the guests of the Montrose Beef Company, who served luncheon at the Fox Hill Country Club for the veterinarians and their lady friends.

After luncheon was served, the veterinarians proceeded to the abattoir, near Pittston, where postmortems were held on tuberculous cattle that had been condemned by the state authorities. At the same time, Dr. C. J. Marshall, of the University of Pennsylvania, gave wonderful demonstrations on "Sterility of Cattle" and "The Functions of the Reproductive Organs."

After the talk given by Dr. Marshall, Dr. H. R. Church, Deputy State Veterinarian, spoke on the indemnity that the farmer receives from the federal government, the state, and the purchasers of the cattle, which makes it an inducement for the farmer to have his cattle tested for tuberculosis by the state authorities, and thereby eliminates that disease and at the same time prevents it from being transmitted from the cattle to the human being, which is only a small part of the work being done by veterinarians.

While the veterinarians were witnessing the postmortems held on the cattle by Dr. J. R. Donnelly, federal veterinarian, the ladies had the pleasure of enjoying themselves at the Country Club by playing cards, etc.

This was one of the summer meetings of the Club, which are held outdoors, and it was one of the most successful meetings held in this part of the State.

Twenty-two veterinarians and thirty-four lady and gentleman visitors were in attendance.

T. D. JAMES, *Secretary.*

MONTANA VETERINARY MEDICAL ASSOCIATION

The annual meeting of the Montana Veterinary Medical Association was held July 29-30,1927, at the Livestock Building, Helena. The attendance was good, several men being present who had not attended a meeting for some years.

In connection with the meeting of the Association, the federal veterinarians stationed in the State were called in for a conference

with the inspector-in-charge, and the deputy state veterinarians met with the state veterinarian.

In addition to transacting considerable business of local interest only, the Association adopted a resolution recommending to the American Veterinary Medical Association that the 1928 meeting be held at Minneapolis. It is very seldom that the meeting place is within reach of Montana veterinarians, but it is possible that we might be able to be represented at Minneapolis.

The speakers of the first day of the meeting were as follows: Governor J. E. Erickson; the retiring president, Dr. F. M. Nelson, of Livingston; Mr. E. M. Phillips, secretary of the State Livestock Commission; Dr. N. G. Cobbett, of the U. S. B. A. I. force, who reported on an investigation of losses in bighorn sheep in Glacier Park; Dr. J. W. Murdoch, inspector-in-charge of the U. S. B. A. I.; Dr. Maurice C. Hall, chief of the Zoological division of the U. S. Bureau of Animal Industry. Dr. Hall's contribution to the program was in the form of a question-box. Everyone present was given an opportunity to ask questions in regard to animal parasites, and Dr. Hall discussed the questions as they were turned in.

In the evening a dinner was served at the Montana Club, for the veterinarians in attendance, with their wives and guests. Dr. Hall was the principal speaker at the dinner, giving a very entertaining account of some of his experiences in Nicaragua. Following the dinner, two motion pictures supplied by the U. S. Department of Agriculture were shown at the Marlowe Theatre.

On the second day, periods were set aside for the discussion of several topics, and a speaker was assigned to lead the discussion in each case, followed by general discussion. The subjects and the principal speakers were as follows: "Lamb Diseases," by Dr. Howard Welch, of the Montana Experiment Station, Bozeman. "Bovine Infectious Abortion," by Dr. W. J. Butler, State Veterinarian. Mr. Fred Stimpert, director of the Hygienic Laboratory of the State Board of Health, discussed the relation between Malta fever and infectious abortion. Tuberculin tests, using both avian and mammalian tuberculin, on a herd from which only skin-lesion and no-lesion cases have been taken for some time, was discussed by Dr. H. Marsh, State Livestock Sanitary Board, and Dr. H. F. Wilkins, District Deputy State Veterinarian; "Canine Practice," by Dr. A. F. Baldwin, Miles City, and Dr. B. O. Fisher, Great Falls.

The election of officers for the coming year resulted as follows:

President, Dr. N. B. Smith, of Billings; vice-president, Dr. J. W. Kilpatrick, of Hamilton; secretary-treasurer, Dr. Hadleigh Marsh, of Helena; Executive Board, Dr. W. J. Butler, of Helena; Dr. H. F. Wilkins, of Lewistown; Dr. J. H. Shoemaker, of Great Falls.

HADLEIGH MARSH, *Secretary.*

ONTARIO VETERINARY ASSOCIATION

The annual meeting of the Ontario Veterinary Association was held at Guelph, August 16-17, 1927, at the Ontario Veterinary College. In the preparation of the program the aim of the committee in charge was to make it broad, comprehensive and educational. Due consideration was given to all branches of veterinary science, and the topics chosen for discussion and demonstration met with the approval of the members as a whole. In the program were found items of value and interest to the practitioner, the meat inspector, the milk inspector, and the field man. All those present expressed their appreciation for the splendid manner in which the meeting was conducted.

The meeting was called to order at 10:00 a. m., by Dr. R. Devereux, president, and an address of welcome by Dr. C. D. McGilvray, principal of the College, was the first item. The remainder of the morning was devoted entirely to matters of business in connection with the Association. The activities of the afternoon of the first day were in the form of addresses, demonstrations, discussions, and clinics of small animals, sheep and swine. The first address was by Dr. F. W. Schofield, of Guelph, and consisted of a demonstration of postmortem lesions beautifully mounted in watch-glasses, a discussion of the various tissue changes and pathological phenomena leading to their formation and their diagnosis.

The next item was a combined address and demonstration of poultry work, by Dr. R. Gwatkin, of Guelph. Considerable discussion followed and many took part in the clinical demonstration. "The Successful Handling of Small Animal Practice" was the subject of an interesting and useful address by Dr. W. J. Rumney, of Hamilton, Following these addresses the members were invited to the clinical department of the College, where operations were performed on small animals, and where clinical observations and discussions took place regarding parasitism in sheep, pneumonia and diarrhea in young pigs, hermaphrodism and congenital hernias in pigs, mange in cats and dogs.

The meeting then adjourned for dinner, following which the election of officers for the ensuing year took place. This election resulted as follows: Dr. R. A. McIntosh, of Guelph, president; Dr. J. S. Glover, of Toronto, 1st vice-president; Dr. J. E. Mumford, of Toronto, 2nd vice-president; Dr. H. M. LeGard, of Weston, secretary. Executive Committee: Drs. R. Gwatkin, Guelph; T. B. Buckley, Toronto; J. Short, Erin; and C. D. McGilvray, Guelph, ex-officio member.

The evening session of the meeting was especially interesting in that two notable members of the profession, Dr. N. S. Mayo, of North Chicago, Illinois, and Dr. C. D. McGilvray, were the principal speakers. Dr. Mayo was introduced by the president and he then addressed the meeting on "The Trend of Veterinary Medicine." In the course of his remarks Dr. Mayo pointed out that the activities of the profession are tending towards the prevention of disease. He also spoke of the advancement being made and changes occurring in reference to both pharmaceutical and biological preparations.

Dr. C. D. McGilvray was the next speaker and addressed the meeting on matters pertaining to the profession as a whole. He pointed out that there was a tendency toward the dissemination of knowledge pertaining to diseases of live stock which rightfully belonged to the profession, and that spreading broadcast such information, unless properly safeguarded, would lessen the opportunities and the usefulness of the profession. The last item for the evening was a lantern-slide lecture on obstetrics, by Dr. R. A. McIntosh, of Guelph.

On the second day of the meeting the program was as follows: "Parasitic Diseases and Diagnosis," by Drs. H. E. Batt and F. W. Schofield. "Milk Inspection Technic," was ably demonstrated by Dr. R. Gwatkin, and in collaboration with this feature a splendid address by Dr. H. F. Lavery, on practical explanation of the general requirements and advantages gained by dairy farmers who are prepared to ship their products under the supervision of veterinary inspection. Dr. Lavery is a member of the Toronto City Health Department.

The afternoon of the second day was devoted entirely to clinics. Those taking part were Drs. W. J. R. Fowler, of Guelph; G. C. Cairns, of London; J. Gillies, of Galt; F. J. Cote, of Guelph; H. M. LeGard, of Weston; and others.

The meeting was well attended and keen interest was manifest throughout the entire proceedings.

R. A. McIntosh, *Res. Sec. for Ontario.*

NECROLOGY

VERNON A. DENNIS

Dr. Vernon A. Dennis died at Flagstaff, Arizona, April 28, 1927. He was a graduate of Ohio State University, class of 1905. In 1906 he entered the Bureau of Animal Industry and, except for a period of about four years, continued in the service until his death. He leaves a widow and six children. Dr. Dennis served in the regular army during the Spanish-American War.

FRANK A. HIGGINS

Dr. Frank A. Higgins, of Milwaukee, Wis., died July 19, 1927. He was a graduate of McKillip Veterinary College, class of 1910. He practiced at Glenbeulah, Wis., for about seven years, and then entered the service of the federal Bureau of Animal Industry. He had been stationed at Milwaukee for about eight years.

JOSEPH S. LAKE

Dr. Joseph S. Lake, of Portsmonth, Ohio, died in a Cleveland hospital, August 11, 1927. He had been taken there the day before, for an operation, in the hope that his life might be prolonged. He had been in poor health for several years and failed to rally from the operation.

Born in Wooster, Ohio, August 28, 1872, the son of a veterinarian, Dr. Lake received his veterinary education at the Ohio Veterinary College, in Cincinnati. He was graduated in 1894. He located at Ripley, then at Ashland, Ky., and later at Bellefontaine, Ohio. He returned to Portsmouth, in 1906, to manage the business established and left by his father.

Dr. Lake joined the A. V. M. A. in 1920. He is survived by his widow, one son and one sister.

CHARLES E. RICE

Dr. Charles E. Rice, of Waveland, Ind., died at his home, August 26, 1926, following a brief illness. He was born near Waveland, July 15, 1870, and was a graduate of the Indiana Veterinary College, class of 1899. He practiced for several years at Rockville, Ind.

Dr. Rice joined the A. V. M. A. in 1919. He is survived by his widow, his mother, five daughters and four brothers.

JOHN W. LEARY

Dr. John W. Leary died in St. Joseph's Hospital, Sioux City, Iowa, August 28, 1927, following an operation performed four days previously.

Born in Chicago, August 7, 1873, Dr. Leary attended Christian Brothers School, and secured his veterinary education in the McKillip Veterinary College. He was graduated in 1907. For three years he was employed in the Health Department of Chicago. He then entered the service of the Bureau of Animal Industry and was stationed at Sioux City, where he remained until his death.

Dr. Leary joined the A. V. M. A. in 1918. He is survived by his widow, three children and one brother.

VICTOR G. KIMBALL

Dr. Victor G. Kimball, assistant professor of medicine in the Veterinary School at the University of Pennsylvania, died September 5, 1927, in the Jefferson Hospital, Philadelphia. Dr. Kimball had been in ill health for several months and was taken to the hospital, four days before his death, after streptococcic infection developed. He has been a member of the faculty of the Veterinary School for sixteen years, beginning as a lecturer and being promoted to assistant professor in 1913.

Born in Pennellville, Oswego County, New York, August 24, 1884, he finished high school and entered the New York State Veterinary College at Cornell University, from which he was graduated in 1908. He was an assistant in the Department of Pathology and Bacteriology there before coming to the University of Pennsylvania, where he became a valuable member of the veterinary faculty and was highly esteemed for his sterling character.

Dr. Kimball joined the A. V. M. A. in 1918. He was also a member of the Pennsylvania State Veterinary Medical Association, Keystone Veterinary Medical. Society, Acacia and Alpha Psi fraternities and F. and A. M. He was an active member of the Universalist Church of the Restoration and a member of the Board of Trustees. He was author of *Veterinary State Board Questions and Answers* and numerous papers on veterinary subjects. His home was at 46 Kent Road, Upper Darby, Pa. He is survived by his widow, Mrs. Mabel Craven Kimball, and a brother and sister.

O. C. SPENCER

Dr. O. C. Spencer died at the Highland Park, Mich., Hospital, September 6, 1927. He was a graduate of the Ontario Veterinary College, class of 1923, and had practiced in Detroit and Highland Park since graduation.

ROBERT MARTIN BANISTER

Dr. Robert M. Banister, of Sumner, Miss., died at the General Hospital, Memphis, Tenn., Sept. 10, 1927. Death followed an operation.

Born September 19, 1880, at Lebanon, Ky., Dr. Banister attended common school and then the Indiana Veterinary College, from which he was graduated in 1918.

Dr. Banister joined the A. V. M. A. in 1926. He was a member of the Missippi State Veterinary Medical Association and the Delta Veterinary Medical Association. Dr. Banister is survived by his widow, nee Pearl Dow, and three daughters, Lucille, Frances and Josephine.

C. B. McCLELLAND

Dr. C. B. McClelland, of Lawrence, Kansas, died September 10, 1927, of cancer of the liver. He was a graduate of the Chicago Veterinary College, class of 1892, and was one of the earliest graduate veterinarians to locate in Kansas.

LEWIS F. HARTZELL

Dr. Lewis F. Hartzell, of Princeton, Ill., died at the Perry Memorial Hospital, September 10, 1927. He had been in poor health for about two months, but had been in the hospital for only about a week prior to his death, the immediate cause of which was gall-bladder trouble.

Dr. Hartzell was a graduate of the Chicago Veterinary College, class of 1906, and practiced in Princeton for twenty years. For the past eight years he was associated with Dr. Fred J. Fawcett (Chi. '05). Dr. Hartzell is survived by one brother.

Our sympathy goes out to Dr. and Mrs. J. F. DeVine, of Goshen, N. Y., in the death of their youngest daughter, Vivian, following injuries received in an automobile accident, August 3, 1927.

PERSONALS

BIRTHS

To Dr. and Mrs. A. M. Walker, of Marathon, Iowa, a daughter, Norma Jean, August 3, 1927.

PERSONALS

Dr. John W. Van Vliet (K. S. A. C. '22) is now located at Holton, Kans.

Dr. William E. Welsh (Iowa '27) is with the Board of Health of Hibbing, Minn.

Dr. I. C. Brown (K. C. V. C. '10) has removed from Afton, Iowa, to Grinnell, Iowa.

Dr. C. C. Lawrence (Iowa '27), formerly of Carson, Iowa, is now located at Manila, Iowa.

Dr. D. E. Bleecker (Chi. '09), formerly of Kasson, Minn., is now located at Columbus, Wis.

Dr. G. E. Failing (Gr. Rap. '12) has been transferred from Paw Paw, Mich., to Oxford, Mich.

Dr. John E. Howard (Ont. '27) is now assisting Dr. W. L. Brenton (Ont. '03), of Detroit, Mich.

Dr. Chas. H. Reid (K. C. V. C. '18) is now practicing at 5625 Sunset Boulevard, Hollywood, Calif.

Dr. H. C. Gale (K. C. V. C. '10) has removed from Clyde, Kans., and is now located at Concordia, Kans.

Dr. H. V. Fleming (O. S. U. '20), formerly of Dayton, Ohio, is now with the Board of Health, Hamilton, Ohio.

Dr. Clarkson Addis (U. P. '17), of Collegeville, Pa., is Master of Hounds of the Montgomery Country Club.

Dr. John Redmond (Ind. '13), formerly of Brewton, Ala., gives a new address: P. O. Box 1201, Mobile, Ala.

Dr. E. D. King, Jr. (A. P. I. '16), of Valdosta, Ga., spent two weeks at Fort Oglethorpe, during the month of August.

Dr. W. C. Sprinkle (T. H. '11), of Martin, Tenn., has been appointed Deputy State Veterinarian of Tennessee.

Dr. F. E. Theobald (Cin. '09) has removed from Marion, Ohio, to Dayton, Ohio. Address: 409 West Fourth Street.

Dr. Albert C. Galbraith (K. C. V. C. '15), of Newville, Pa., is Secretary of the Cumberland Valley Veterinary Club.

Dr. F. R. Allerton (K. S. A. C. '25), formerly of Morrill, Kans., is now located at 1151 N. Highland Ave., Hollywood, Calif.

Dr. Daniel R. Kohler (Ont. '93), of Boyertown, Pa., is President and a Director of the National Bank of Boyertown.

Dr. H. H. Groth (O. S. U. '26) is now associated with Drs. Arburua and McInnes, at 26 Fell St., San Francisco, Calif.

Dr. Geo. C. Faville (Iowa '79), who has been at Phoebus, Va., the past year, has returned to Hampton Institute, Hampton, Va.

Dr. E. E. Patterson (Gr. Rap. '01), of Detroit, Mich., officiated as veterinarian at the Michigan State Fair, the past month.

Dr. Floyd C. Moss (Wash. '23), assistant territorial veterinarian of Hawaii, has been transferred from Paia, Maui, to Honolulu.

Major Samuel Robinson (Ont. '04), of Brandon, Man., has removed to Victoria, B. C., where he expects to live in the future.

Dr. V. J. Robinson (Chi. '09), formerly of Atlantic, Iowa, has opened a small-animal hospital at 142 E. Lake St., Minneapolis, Minn.

Dr. R. E. Hammond (O. S. U. '27) has accepted a position in Dayton, Ohio, in connection with the municipal inspection of meat and milk.

Dr. C. C. Kitchen (O. S. U. '15), who has been located at Bucyrus, Ohio, has removed to Fremont, Ohio, where he plans to open an office.

Dr. Benjamin A. Zupp (Iowa '23) has resigned his position at the Iowa State College and has located for general practice at Blue Earth, Minn.

Dr. Lewis H. Moe (O. S. U. '27) has accepted an appointment as assistant in pathology, College of Veterinary Medicine, Ohio State University.

Dr. G. Gus E. Vaselius (Corn. '22), Chemung County (N. Y.) Veterinarian since 1924, has changed his residence from Spencer, N. Y., to Horseheads, N. Y.

Dr. Geo. P. Ellice (Amer. '98), formerly of Rutherford, N. J., has removed to East Rutherford, N. J., and has opened an up-to-date veterinary hospital there.

Dr. W. B. Lincoln (Iown '93), state veterinarian of Tennessee, has been appointed official veterinarian to the National Dairy Exposition, to be held at Memphis, October 15-22.

Dr. H. L. Ragsdale (K. C. V. C. '17) has resigned from the Bureau of Animal Industry and accepted a position with Abbott's Alderney Dairies, of Philadelphia. Dr. Ragsdale has removed from Williamsport, Pa., to Oxford, Pa.

Dr. N. G. Covington (U. P. '20) has resigned his position at the Alabama Polytechnic Institute to accept the chair of physiology and pharmacology in the College of Veterinary Medicine, State College of Washington, Pullman.

Dr. James S. Hogg (U. P. '24) has resigned his position with Abbott's Alderney Dairies, of Philadelphia, and has gone into partnership with his brother, Dr. Ernest W. Hogg, (U. P. '14), at 20 Darling St., Wilkes-Barre, Pa.

Dr. S. S. Worley (Wash. '22) has resigned his position as poultry veterinarian at the Western Washington Experiment Station, Puyallup, and has established the Bellingham Veterinary and Poultry Laboratories, at Bellingham, Wash.

Dr. Elmer Lash (K. C. V. C. '08), who has been officially stationed in Washington, D. C., has been transferred to Des Moines, Iowa, from which point he will supervise the eradication of avian tuberculosis, in addition to supervising other activities of the Tuberculosis Eradication Division of the Bureau of Animal Industry.